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ABSTRACT

In 1990, the National Assessment of Educational Progress (NAEP) included a Trial State Assessment (TSA); for the first time in the NAEP's history, voluntary state-by-state assessments (37 states, the District of Columbia, Guam, and the Virgin Islands) were made. The sample was designed to represent the 8th grade public school population in a state or territory. The 1990 TSA covered five mathematics content areas (numbers and operations; measurement; geometry; data analysis, statistics, and probability; and algebra and functions). In Pennsylvania, 2,528 students in 95 public schools were assessed. This report describes the mathematics proficiency of Pennsylvania eighth-graders, compares their overall performance to students in the Northeast region of the United States and the nation (using data from the NAEP national assessments), presents the average proficiency separately for the five content areas, and summarizes the performance of subpopulations (race/ethnicity, type of community, parents' educational level, and gender). To provide a context for the assessment data, participating students, their mathematics teachers, and principals completed questionnaires which focused on: instructional content (curriculum coverage, amount of homework); delivery of math instruction (availability of resources, type); use of calculators; educational background of teachers; and conditions facilitating math learning (e.g., hours of television watched, absenteeism). On the NAEP math scale, Pennsylvania students had an average proficiency of 266 compared to 261 nationwide. Many fewer students (Pennsylvania-15%; U.S.-12%) appear to have acquired reasoning and problem solving skills. (JJK/CRW)

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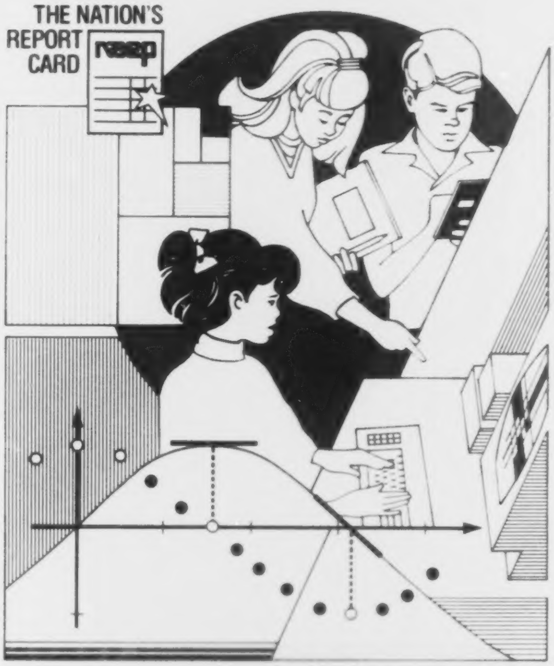
The STATE of Mathematics Achievement in PENNSYLVANIA

The Trial State Assessment at Grade Eight



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In 1988, Congress created the National Assessment Governing Board (NAGB) to formulate policy guidelines for NAEP. The board is responsible for selecting the subject areas to be assessed, which may include adding to those specified by Congress; identifying appropriate achievement goals for each age and grade; developing assessment objectives; developing test specifications; designing the assessment methodology; developing guidelines and standards for data analysis and for reporting and disseminating results; developing standards and procedures for interstate, regional, and national comparisons; improving the form and use of the National Assessment; and ensuring that all items selected for use in the National Assessment are free from racial, cultural, gender, or regional bias.

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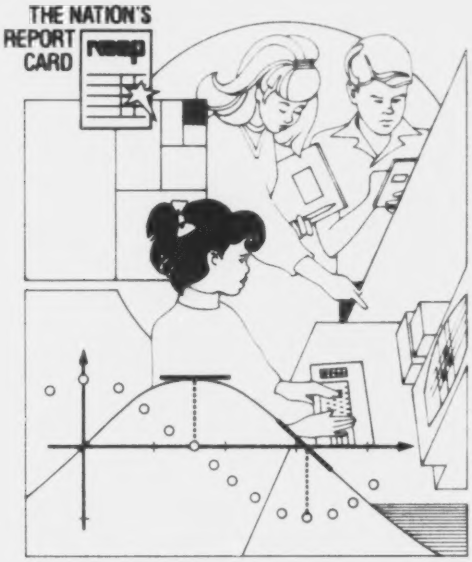
The STATE of Mathematics Achievement in PENNSYLVANIA

The Trial State Assessment at Grade Eight



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FOR MORE INFORMATION:

Copies of the 1990 NAEP Trial State Assessment's individual State reports are available directly from the participating States. For ordering information, please contact the assessment division of your State Department of Education. For ordering information on the composite report of results for the Nation and all State participants, or for single copies of the Executive Summary while supplies last, write:

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THE NATION'S
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EXECUTIVE SUMMARY

In 1988, Congress passed new legislation for the National Assessment of Educational Progress (NAEP), which included -- for the first time in the project's history -- a provision authorizing voluntary state-by-state assessments on a trial basis, in addition to continuing its primary mission, the national assessments that NAEP has conducted since its inception.

As a result of the legislation, the 1990 NAEP program included a Trial State Assessment Program in eighth-grade mathematics. National assessments in mathematics, reading, writing, and science were conducted simultaneously in 1990 at grades four, eight, and twelve.

For the Trial State Assessment, eighth-grade public-school students were assessed in each of 37 states, the District of Columbia, and two territories in February 1990. The sample was carefully designed to represent the eighth-grade public-school population in a state or territory. Within each selected school, students were randomly chosen to participate in the program. Local school district personnel administered all assessment sessions, and the contractor's staff monitored 50 percent of the sessions as part of the quality assurance program designed to ensure that the sessions were being conducted uniformly. The results of the monitoring indicated a high degree of quality and uniformity across sessions.

In Pennsylvania, 95 public schools participated in the assessment. The weighted school participation rate was 93 percent, which means that all of the eighth-grade students in this sample of schools were representative of 93 percent of the eighth-grade public-school students in Pennsylvania.

In each school, a random sample of students was selected to participate in the assessment. As estimated by the sample, 1 percent of the eighth-grade public-school population was classified as Limited English Proficient (LEP), while 10 percent had an Individualized Education Plan (IEP). An IEP is a plan, written for a student who has been determined to be eligible for special education, that typically sets forth goals and objectives for the student and describes a program of activities and/or related services necessary to achieve the goals and objectives.

Schools were permitted to exclude certain students from the assessment. To be excluded from the assessment, a student had to be categorized as Limited English Proficient or had to have an Individualized Education Plan *and* (in either case) be judged incapable of participating in the assessment. The students who were excluded from the assessment because they were categorized as LEP or had an IEP represented 0 percent and 5 percent of the population, respectively. In total, 2,528 eighth-grade Pennsylvania public-school students were assessed. The weighted student participation rate was 94 percent. This means that the sample of students who took part in the assessment was representative of 94 percent of the **eligible** eighth-grade public-school student population in Pennsylvania.

Students' Mathematics Performance

The average proficiency of eighth-grade public-school students from Pennsylvania on the NAEP mathematics scale is 266. This proficiency is higher than that of students across the nation (261).

Average proficiency on the NAEP scale provides a global view of eighth graders' mathematics achievement; however, it does not reveal specifically what the students know and can do in the subject. To describe the nature of students' proficiency in greater detail, NAEP used the results from the 1990 national assessments of fourth-, eighth-, and twelfth-grade students to define the skills, knowledge, and understandings that characterize four levels of mathematics performance -- levels 200, 250, 300, and 350 -- on the NAEP scale.

In Pennsylvania, 98 percent of the eighth graders, compared to 97 percent in the nation, appear to have acquired skills involving simple additive reasoning and problem solving with whole numbers (level 200). However, many fewer students in Pennsylvania (15 percent) and 12 percent in the nation appear to have acquired reasoning and problem-solving skills involving fractions, decimals, percents, elementary geometric properties, and simple algebraic manipulations (level 300).

The Trial State Assessment included five content areas -- Numbers and Operations; Measurement; Geometry; Data Analysis, Statistics, and Probability; and Algebra and Functions. Students in Pennsylvania performed higher than students in the nation in Measurement. Students in Pennsylvania performed comparably to students in the nation in Numbers and Operations, Geometry, Data Analysis, Statistics, and Probability, and Algebra and Functions.

Subpopulation Performance

In addition to the overall results, the 1990 Trial State Assessment permits reporting on the performance of various subpopulations of the Pennsylvania eighth-grade student population defined by race/ethnicity, type of community, parents' education level, and gender. In Pennsylvania:

- White students had higher average mathematics proficiency than did Black or Hispanic students.

- Further, a greater percentage of White students than Black or Hispanic students attained level 300.

- The results by type of community indicate that the average mathematics performance of the Pennsylvania students attending schools in advantaged urban areas was higher than that of students attending schools in disadvantaged urban areas, extreme rural areas, or areas classified as "other".

- In Pennsylvania, the average mathematics proficiency of eighth-grade public-school students having at least one parent who graduated from college was approximately 33 points higher than that of students whose parents did not graduate from high school.

- The results by gender show that eighth-grade males in Pennsylvania had a higher average mathematics proficiency than did eighth-grade females in Pennsylvania. In addition, a greater percentage of males than females in Pennsylvania attained level 300. Compared to the national results, females in Pennsylvania performed no differently from females across the country; males in Pennsylvania performed higher than males across the country.

A Context for Understanding Students' Mathematics Proficiency

Information on students' mathematics proficiency is valuable in and of itself, but it becomes more useful for improving instruction and setting policy when supplemented with contextual information about schools, teachers, and students.

To gather such information, the students participating in the 1990 Trial State Assessment, their mathematics teachers, and the principals or other administrators in their schools were asked to complete questionnaires on policies, instruction, and programs. Taken together, the student, teacher, and school data help to describe some of the current practices and emphases in mathematics education, illuminate some of the factors that appear to be related to eighth-grade public-school students' proficiency in the subject, and provide an educational context for understanding information about student achievement.

Some of the salient results for the public-school students in Pennsylvania are as follows:

- About three-quarters of the students in Pennsylvania (74 percent) were in schools where mathematics was identified as a special priority. This is about the same percentage as that for the nation (63 percent).

- In Pennsylvania, 88 percent of the students could take an algebra course in eighth grade for high-school course placement or credit.

- About the same percentage of students in Pennsylvania were taking eighth-grade mathematics (49 percent) as were taking a course in pre-algebra or algebra (48 percent). Across the nation, 62 percent were taking eighth-grade mathematics and 34 percent were taking a course in pre-algebra or algebra.

- According to their teachers, the greatest percentage of eighth-grade students in public schools in Pennsylvania spent either 15 or 30 minutes doing mathematics homework each day; according to the students, most of them spent 15 minutes doing mathematics homework each day. Across the nation, teachers reported that the largest percentage of students spent either 15 or 30 minutes doing mathematics homework each day, while students reported either 15 or 30 minutes daily.

- Students whose teachers placed heavy instructional emphasis on Algebra and Functions had higher proficiency in this content area than students whose teachers placed little or no emphasis on Algebra and Functions. Students whose teachers placed heavy instructional emphasis on Numbers and Operations and Measurement had lower proficiency in these content areas than students whose teachers placed little or no emphasis on the same areas.

- In Pennsylvania, 19 percent of the eighth-grade students had mathematics teachers who reported getting **all** of the resources they needed, while 29 percent of the students were taught by teachers who got only **some or none** of the resources they needed. Across the nation, these figures were 13 percent and 31 percent, respectively.
- In Pennsylvania, 36 percent of the students never used a calculator to work problems in class, while 41 percent almost always did.
- In Pennsylvania, 47 percent of the students were being taught by mathematics teachers who reported having **at least** a master's or education specialist's degree. This compares to 44 percent for students across the nation.
- Many of the students (80 percent) had teachers who had the highest level of teaching certification available. This is different from the figure for the nation, where 66 percent of students were taught by teachers who were certified at the highest level available in their states.
- Students in Pennsylvania who had four types of reading materials (an encyclopedia, newspapers, magazines, and more than 25 books) at home showed higher mathematics proficiency than did students with zero to two types of these materials. This is similar to the results for the nation, where students who had all four types of materials showed higher mathematics proficiency than did students who had zero to two types.
- Some of the eighth-grade public-school students in Pennsylvania (14 percent) watched one hour or less of television each day; 10 percent watched six hours or more. Average mathematics proficiency was lowest for students who spent six hours or more watching television each day.

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INTRODUCTION

As a result of legislation enacted in 1988, the 1990 National Assessment of Educational Progress (NAEP) included a Trial State Assessment Program in eighth-grade mathematics. The Trial State Assessment was conducted in February 1990 with the following participants:

Alabama
Arizona
Arkansas
California
Colorado
Connecticut
Delaware
District of Columbia
Florida
Georgia
Hawaii
Idaho
Illinois
Indiana
Iowa
Kentucky
Louisiana
Maryland
Michigan
Minnesota
Montana
Nebraska
New Hampshire
New Jersey
New Mexico
New York
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
Texas
Virginia
West Virginia
Wisconsin
Wyoming

Guam
Virgin Islands

This report describes the performance of the eighth-grade public-school students in Pennsylvania and consists of three sections:

- This Introduction provides background information about the Trial State Assessment and this report. It also provides a profile of the eighth-grade public-school students in Pennsylvania.
- Part One describes the mathematics performance of the eighth-grade public-school students in Pennsylvania, the Northeast region, and the nation.
- Part Two relates students' mathematics performance to contextual information about the mathematics policies and instruction in schools in Pennsylvania, the Northeast region, and the nation.

Overview of the 1990 Trial State Assessment

In 1988, Congress passed new legislation for the National Assessment of Educational Progress (NAEP), which included -- for the first time in the project's history -- a provision authorizing voluntary state-by-state assessments on a trial basis, in addition to continuing its primary mission, the national assessments that NAEP has conducted since its inception:

> *The National Assessment shall develop a trial mathematics assessment survey instrument for the eighth grade and shall conduct a demonstration of the instrument in 1990 in States which wish to participate, with the purpose of determining whether such an assessment yields valid, reliable State representative data. (Section 406 (i)(2)(C)(i) of the General Education Provisions Act, as amended by Pub. L. 100-297 (20 U.S.C. 1221e-1(i)(2)(C)(i)))*

As a result of the legislation, the 1990 NAEP program included a Trial State Assessment Program in eighth-grade mathematics. National assessments in mathematics, reading, writing, and science were conducted simultaneously in 1990 at grades four, eight, and twelve.

For the Trial State Assessment, eighth-grade public-school students were assessed in each state or territory. The sample was carefully designed to represent the eighth-grade public-school population in the state or territory. Within each selected school, students were randomly chosen to participate in the program. Local school district personnel administered all assessment sessions, and the contractor's staff monitored 50 percent of the sessions as part of the quality assurance program designed to ensure that the sessions were being conducted uniformly. The results of the monitoring indicated a high degree of quality and uniformity across sessions.

The Trial State Assessment was based on a set of mathematics objectives newly developed for the program and patterned after the consensus process described in Public Law 98-511, Section 405 (E), which authorized NAEP through June 30, 1988. Anticipating the 1988 legislation that authorized the Trial State Assessment, the federal government arranged for the National Science Foundation and the U.S. Department of Education to issue a special grant to the Council of Chief State School Officers in mid-1987 to develop the objectives. The development process included careful attention to the standards developed by the National Council of Teachers of Mathematics,[1] the formal mathematics objectives of states and of a sampling of local districts, and the opinions of practitioners at the state and local levels as to what content should be assessed.

There was an extensive review by mathematics educators, scholars, states' mathematics supervisors, the National Center for Education Statistics (NCES), and the Assessment Policy Committee (APC), a panel that advised on NAEP policy at that time. The objectives were further refined by NAEP's Item Development Panel, reviewed by the Task Force on State Comparisons, and resubmitted to NCES for peer review. Because the objectives needed to be coordinated across all the grades for the national program, the final objectives provided specifications for the 1990 mathematics assessment at the fourth, eighth, and twelfth grades rather than solely for the Trial State Assessment in grade eight. An overview of the mathematics objectives is provided in the Procedural Appendix.

This Report

This is a computer-generated report that describes the performance of eighth-grade public-school students in Pennsylvania, in the Northeast region, and for the nation. Results also are provided for groups of students defined by shared characteristics -- race/ethnicity, type of community, parents' education level, and gender. Definitions of the subpopulations referred to in this report are presented below. The results for Pennsylvania are based only on the students included in the Trial State Assessment Program. However, the results for the nation and the region of the country are based on the nationally and regionally representative samples of public-school students who were assessed in January or February as part of the 1990 national NAEP program. Use of the regional and national results from the 1990 national NAEP program was necessary because the voluntary nature of the Trial State Assessment Program did not guarantee representative national or regional results, since not every state participated in the program.

---

[1] National Council of Teachers of Mathematics, *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

RACE/ETHNICITY

Results are presented for students of different racial/ethnic groups based on the students' self-identification of their race/ethnicity according to the following mutually exclusive categories: White, Black, Hispanic, Asian (including Pacific Islander), and American Indian (including Alaskan Native). Based on criteria described in the Procedural Appendix, there must be at least 62 students in a particular subpopulation in order for the results for that subpopulation to be considered reliable. Thus, results for racial/ethnic groups with fewer than 62 students are not reported. However, the data for all students, regardless of whether their racial/ethnic group was reported separately, were included in computing overall results for Pennsylvania.

TYPE OF COMMUNITY

Results are provided for four mutually exclusive community types -- advantaged urban, disadvantaged urban, extreme rural, and other -- as defined below:

> *Advantaged Urban:* Students in this group live in metropolitan statistical areas and attend schools where a high proportion of the students' parents are in professional or managerial positions.
>
> *Disadvantaged Urban:* Students in this group live in metropolitan statistical areas and attend schools where a high proportion of the students' parents are on welfare or are not regularly employed.
>
> *Extreme Rural:* Students in this group live outside metropolitan statistical areas, live in areas with a population below 10,000, and attend schools where many of the students' parents are farmers or farm workers.
>
> *Other:* Students in this category attend schools in areas other than those defined as advantaged urban, disadvantaged urban, or extreme rural.

The reporting of results by each type of community was also subject to a minimum student sample size of 62.

PARENTS' EDUCATION LEVEL

Students were asked to indicate the extent of schooling for each of their parents -- did not finish high school, graduated high school, some education after high school, or graduated college. The response indicating the higher level of education was selected for reporting.

GENDER

Results are reported separately for males and females.

REGION

The United States has been divided into four regions: Northeast, Southeast, Central, and West. States included in each region are shown in Figure 1. All 50 states and the District of Columbia are listed, with the participants in the Trial State Assessment highlighted in boldface type. Territories were not assigned to a region. Further, the part of Virginia that is included in the Washington, DC, metropolitan statistical area is included in the Northeast region; the remainder of the state is included in the Southeast region. Because most of the students are in the Southeast region, regional comparisons for Virginia will be to the Southeast.

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FIGURE 1 | **Regions of the Country**

NORTHEAST	SOUTHEAST	CENTRAL	WEST
Connecticut	**Alabama**	**Illinois**	Alaska
Delaware	**Arkansas**	**Indiana**	**Arizona**
District of Columbia	**Florida**	**Iowa**	**California**
Maine	**Georgia**	Kansas	**Colorado**
Maryland	**Kentucky**	**Michigan**	**Hawaii**
Massachusetts	**Louisiana**	**Minnesota**	**Idaho**
New Hampshire	Mississippi	Missouri	**Montana**
New Jersey	**North Carolina**	**Nebraska**	Nevada
New York	South Carolina	**North Dakota**	**New Mexico**
Pennsylvania	Tennessee	**Ohio**	**Oklahoma**
Rhode Island	**Virginia**	South Dakota	**Oregon**
Vermont	**West Virginia**	**Wisconsin**	**Texas**
Virginia			Utah
			Washington
			Wyoming

Guidelines for Analysis

This report describes and compares the mathematics proficiency of various subpopulations of students -- for example, those who have certain demographic characteristics or who responded to a specific background question in a particular way. The report examines the results for individual subpopulations and individual background questions. It does not include an analysis of the relationships among combinations of these subpopulations or background questions.

Because the proportions of students in these subpopulations and their average proficiency are based on samples -- rather than the entire population of eighth graders in public schools in the state or territory -- the numbers reported are necessarily *estimates*. As such, they are subject to a measure of uncertainty, reflected in the *standard error* of the estimate. When the proportions or average proficiency of certain subpopulations are compared, it is essential that the standard error be taken into account, rather than relying solely on observed similarities or differences. Therefore, the comparisons discussed in this report are based on *statistical tests* that consider both the magnitude of the difference between the means or proportions and the standard errors of those statistics.

The statistical tests determine whether the evidence -- based on the data from the groups in the sample -- is strong enough to conclude that the means or proportions are really different for those groups in the *population*. If the evidence is strong (i.e., the difference is *statistically significant*), the report describes the group means or proportions as being different (e.g., one group performed *higher than* or *lower than* another group) -- regardless of whether the sample means or sample proportions appear to be about the same or not. If the evidence is not sufficiently strong (i.e., the difference is not statistically significant), the means or proportions are described as being *about the same* -- again, regardless of whether the sample means or sample proportions appear to be about the same or widely discrepant.

The reader is cautioned to rely on the results of the statistical tests -- rather than on the apparent magnitude of the difference between sample means or proportions -- to determine whether those sample differences are likely to represent actual differences between the groups in the population. If a statement appears in the report indicating that a particular group had *higher (or lower)* average proficiency than a second group, the 95 percent confidence interval for the difference between groups did not contain the value zero. When a statement indicates that the average proficiency or proportion of some attribute was *about the same* for two groups, the confidence interval included zero, and thus no difference could be assumed between the groups. When three or more groups are being compared, a Bonferroni procedure is also used. The statistical tests and Bonferroni procedure are discussed in greater detail in the Procedural Appendix.

It is also important to note that the confidence intervals pictured in the figures in Part One of this report are approximate 95 percent confidence intervals about the mean of a particular population of interest. Comparing such confidence intervals for two populations is not equivalent to examining the 95 percent confidence interval for the difference between the means of the populations. If the individual confidence intervals for two populations do not overlap, it is true that there is a statistically significant difference between the populations. However, if the confidence intervals overlap, it is not always true that there is *not* a statistically significant difference between the populations.

Finally, in several places in this report, results (mean proficiencies and proportions) are reported in the text for combined groups of students. For example, in the text, the percentage of students in the combined group taking either algebra or pre-algebra is given and compared to the percentage of students enrolled in eighth-grade mathematics. However, the tables that accompany that text report percentages and proficiencies separately for the three groups (algebra, pre-algebra, and eighth-grade mathematics). The combined-group percentages reported in the text and used in all statistical tests are based on *unrounded* estimates (i.e., estimates calculated to several decimal places) of the percentages in each group. The percentages shown in the tables are *rounded* to integers. Hence, the percentage for a combined group (reported in the text) may differ slightly from the sum of the separate percentages (presented in the tables) for each of the groups that were combined. Similarly, if statistical tests were to be conducted based on the rounded numbers in the tables, the results might not be consonant with the results of the statistical tests that are reported in the text (based on unrounded numbers).

Profile of Pennsylvania

EIGHTH-GRADE SCHOOL AND STUDENT CHARACTERISTICS

Table 1 provides a profile of the demographic characteristics of the eighth-grade public-school students in Pennsylvania, the Northeast region, and the nation. This profile is based on data collected from the students and schools participating in the Trial State Assessment.

TABLE 1 | **Profile of Pennsylvania Eighth-Grade Public-School Students**

PERCENTAGE OF STUDENTS

1990 NAEP TRIAL STATE ASSESSMENT	Pennsylvania	Northeast	Nation
DEMOGRAPHIC SUBGROUPS	**Percentage**	**Percentage**	**Percentage**
Race/Ethnicity			
White	81 (2.5)	80 (4.2)	70 (0.5)
Black	12 (2.3)	12 (4.2)	16 (0.3)
Hispanic	5 (0.8)	5 (1.2)	10 (0.4)
Asian	1 (0.2)	3 (1.1)	2 (0.5)
American Indian	1 (0.3)	1 (0.3)	2 (0.7)
Type of Community			
Advantaged urban	12 (2.4)	23 (7.3)	10 (3.3)
Disadvantaged urban	14 (3.3)	8 (5.7)	10 (2.8)
Extreme rural	7 (2.7)	14 (10.3)	10 (3.0)
Other	67 (4.3)	55 (11.2)	70 (4.4)
Parents' Education			
Did not finish high school	6 (0.6)	7 (2.2)	10 (0.8)
Graduated high school	34 (1.2)	23 (3.3)	25 (1.2)
Some education after high school	20 (0.9)	15 (3.0)	17 (0.9)
Graduated college	35 (1.4)	49 (5.8)	39 (1.9)
Gender			
Male	51 (1.1)	50 (2.1)	51 (1.1)
Female	49 (1.1)	50 (2.1)	49 (1.1)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. The percentages for Race/Ethnicity may not add to 100 percent because some students categorized themselves as "Other." This may also be true of Parents' Education, for which some students responded "I don't know." Throughout this report, percentages less than 0.5 percent are reported as 0 percent.

SCHOOLS AND STUDENTS ASSESSED

Table 2 provides a profile summarizing participation data for Pennsylvania schools and students sampled for the 1990 Trial State Assessment. In Pennsylvania, 95 public schools participated in the assessment. The weighted school participation rate was 93 percent, which means that all of the eighth-grade students in this sample of schools were representative of 93 percent of the eighth-grade public-school students in Pennsylvania.

TABLE 2 | Profile of the Population Assessed in Pennsylvania

EIGHTH-GRADE PUBLIC SCHOOL PARTICIPATION

Weighted school participation rate before substitution	90%
Weighted school participation rate after substitution	93%
Number of schools originally sampled	106
Number of schools not eligible	4
Number of schools in original sample participating	92
Number of substitute schools provided	4
Number of substitute schools participating	3
Total number of participating schools	95

EIGHTH-GRADE PUBLIC-SCHOOL STUDENT PARTICIPATION

Weighted student participation rate after make-ups	94%
Number of students selected to participate in the assessment	2,900
Number of students withdrawn from the assessment	77
Percentage of students who were of Limited English Proficiency	1%
Percentage of students excluded from the assessment due to Limited English Proficiency	0%
Percentage of students who had an Individualized Education Plan	10%
Percentage of students excluded from the assessment due to Individualized Education Plan status	5%
Number of students to be assessed	2,675
Number of students assessed	2,528

For six students in Pennsylvania, the assessment was conducted, but the materials were destroyed in shipping via the U.S. Postal Service. Therefore, these students were treated in the same manner as absent students because no student responses were available for analysis and reporting.

In each school, a random sample of students was selected to participate in the assessment. As estimated by the sample, 1 percent of the eighth-grade public-school population was classified as Limited English Proficient (LEP), while 10 percent had an Individualized Education Plan (IEP). An IEP is a plan, written for a student who has been determined to be eligible for special education, that typically sets forth goals and objectives for the student and describes a program of activities and/or related services necessary to achieve the goals and objectives.

Schools were permitted to exclude certain students from the assessment. To be excluded from the assessment, a student had to be categorized as Limited English Proficient or had to have an Individualized Education Plan *and* (in either case) be judged incapable of participating in the assessment. The students who were excluded from the assessment because they were categorized as LEP or had an IEP represented 0 percent and 5 percent of the population, respectively.

In total, 2,528 eighth-grade Pennsylvania public-school students were assessed. The weighted student participation rate was 94 percent. This means that the sample of students who took part in the assessment was representative of 94 percent of the **eligible** eighth-grade public-school student population in Pennsylvania.

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PART ONE

How Proficient in Mathematics Are Eighth-Grade Students in Pennsylvania Public Schools?

The 1990 Trial State Assessment covered five mathematics content areas -- Numbers and Operations; Measurement; Geometry; Data Analysis, Statistics, and Probability; and Algebra and Functions. Students' overall performance in these content areas was summarized on the NAEP mathematics scale, which ranges from 0 to 500.

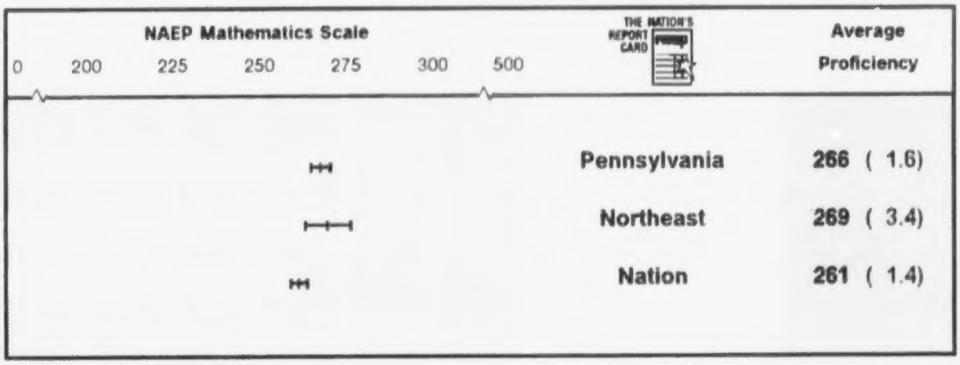
This part of the report contains two chapters that describe the mathematics proficiency of eighth-grade public-school students in Pennsylvania. Chapter 1 compares the overall mathematics performance of the students in Pennsylvania to students in the Northeast region and the nation. It also presents the students' average proficiency separately for the five mathematics content areas. Chapter 2 summarizes the students' overall mathematics performance for subpopulations defined by race/ethnicity, type of community, parents' education level, and gender, as well as their mathematics performance in the five content areas.

CHAPTER 1

Students' Mathematics Performance

As shown in Figure 2, the average proficiency of eighth-grade public-school students from Pennsylvania on the NAEP mathematics scale is 266. This proficiency is higher than that of students across the nation (261).[2]

FIGURE 2 | **Average Eighth-Grade Public-School Mathematics Proficiency**



The standard errors are presented in parentheses. With about 95 percent certainty, the average mathematics proficiency for each population of interest is within ± 2 standard errors of the estimated mean (95 percent confidence interval, denoted by ⊢+⊣). If the confidence intervals for the populations do not overlap, there is a statistically significant difference between the populations.

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[2] Differences reported are statistically different at about the 95 percent certainty level. This means that with about 95 percent certainty there is a real difference in the average mathematics proficiency between the two populations of interest.

LEVELS OF MATHEMATICS PROFICIENCY

Average proficiency on the NAEP scale provides a global view of eighth graders' mathematics achievement; however, it does not reveal the specifics of what the students know and can do in the subject. To describe the nature of students' proficiency in greater detail, NAEP used the results from the 1990 national assessments of fourth-, eighth-, and twelfth-grade students to define the skills, knowledge, and understandings that characterize four levels of mathematics performance -- levels 200, 250, 300, and 350 -- on the NAEP scale.

To define the skills, knowledge, and understandings that characterize each proficiency level, mathematics specialists studied the questions that were typically answered correctly by most students at a particular level but answered incorrectly by a majority of students at the next lower level. They then summarized the kinds of abilities needed to answer each set of questions. While defining proficiency levels below 200 and above 350 is theoretically possible, so few students performed at the extreme ends of the scale that it was impractical to define meaningful levels of mathematics proficiency beyond the four presented here.

Definitions of the four levels of mathematics proficiency are given in Figure 3. It is important to note that the definitions of these levels are based solely on student performance on the 1990 mathematics assessment. The levels are not judgmental standards of what ought to be achieved at a particular grade. Figure 4 provides the percentages of students at or above each of these proficiency levels. In Pennsylvania, 98 percent of the eighth graders, compared to 97 percent in the nation, appear to have acquired skills involving simple additive reasoning and problem solving with whole numbers (level 200). However, many fewer students in Pennsylvania (15 percent) and 12 percent in the nation appear to have acquired reasoning and problem-solving skills involving fractions, decimals, percents, elementary geometric properties, and simple algebraic manipulations (level 300).

CONTENT AREA PERFORMANCE

As previously indicated, the questions comprising the Trial State Assessment covered five content areas -- Numbers and Operations; Measurement; Geometry; Data Analysis, Statistics, and Probability; and Algebra and Functions. Figure 5 provides the Pennsylvania, Northeast region, and national results for each content area. Students in Pennsylvania performed higher than students in the nation in Measurement. Students in Pennsylvania performed comparably to students in the nation in Numbers and Operations, Geometry, Data Analysis, Statistics, and Probability, and Algebra and Functions.

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FIGURE 3 | Levels of Mathematics Proficiency

LEVEL 200 — Simple Additive Reasoning and Problem Solving with Whole Numbers

Students at this level have some degree of understanding of simple quantitative relationships involving whole numbers. They can solve simple addition and subtraction problems with and without regrouping. Using a calculator, they can extend these abilities to multiplication and division problems. These students can identify solutions to one-step word problems and select the greatest four-digit number in a list.

In measurement, these students can read a ruler as well as common weight and graduated scales. They also can make volume comparisons based on visualization and determine the value of coins. In geometry, these students can recognize simple figures. In data analysis, they are able to read simple bar graphs. In the algebra dimension, these students can recognize translations of word problems to numerical sentences and extend simple pattern sequences.

LEVEL 250 — Simple Multiplicative Reasoning and Two-Step Problem Solving

Students at this level have extended their understanding of quantitative reasoning with whole numbers from additive to multiplicative settings. They can solve routine one-step multiplication and division problems involving remainders and two-step addition and subtraction problems involving money. Using a calculator, they can identify solutions to other elementary two-step word problems. In these basic problem-solving situations, they can identify missing or extraneous information and have some knowledge of when to use computational estimation. They have a rudimentary understanding of such concepts as whole number place value, "even," "factor," and "multiple."

In measurement, these students can use a ruler to measure objects, convert units within a system when the conversions require multiplication, and recognize a numerical expression solving a measurement word problem. In geometry, they demonstrate an initial understanding of basic terms and properties, such as parallelism and symmetry. In data analysis, they can complete a bar graph, sketch a circle graph, and use information from graphs to solve simple problems. They are beginning to understand the relationship between proportion and probability. In algebra, they are beginning to deal informally with a variable through numerical substitution in the evaluation of simple expressions.

FIGURE 3 (continued) | Levels of Mathematics Proficiency

LEVEL 300	**Reasoning and Problem Solving Involving Fractions, Decimals, Percents, Elementary Geometric Properties, and Simple Algebraic Manipulations**

Students at this level are able to represent, interpret, and perform simple operations with fractions and decimal numbers. They are able to locate fractions and decimals on number lines, simplify fractions, and recognize the equivalence between common fractions and decimals, including pictorial representations. They can interpret the meaning of percents less than and greater than 100 and apply the concepts of percentages to solve simple problems. These students demonstrate some evidence of using mathematical notation to interpret expressions, including those with exponents and negative integers.

In measurement, these students can find the perimeters and areas of rectangles, recognize relationships among common units of measure, and use proportional relationships to solve routine problems involving similar triangles and scale drawings. In geometry, they have some mastery of the definitions and properties of geometric figures and solids.

In data analysis, these students can calculate averages, select and interpret data from tabular displays, pictographs, and line graphs, compute relative frequency distributions, and have a beginning understanding of sample bias. In algebra, they can graph points in the Cartesian plane and perform simple algebraic manipulations such as simplifying an expression by collecting like terms, identifying the solution to open linear sentences and inequalities by substitution, and checking and graphing an interval representing a compound inequality when it is described in words. They can determine and apply a rule for simple functional relations and extend a numerical pattern.

LEVEL 350	**Reasoning and Problem Solving Involving Geometric Relationships, Algebraic Equations, and Beginning Statistics and Probability**

Students at this level have extended their knowledge of number and algebraic understanding to include some properties of exponents. They can recognize scientific notation on a calculator and make the transition between scientific notation and decimal notation. In measurement, they can apply their knowledge of area and perimeter of rectangles and triangles to solve problems. They can find the circumferences of circles and the surface areas of solid figures. In geometry, they can apply the Pythagorean theorem to solve problems involving indirect measurement. These students also can apply their knowledge of the properties of geometric figures to solve problems, such as determining the slope of a line.

In data analysis, these students can compute means from frequency tables and determine the probability of a simple event. In algebra, they can identify an equation describing a linear relation provided in a table and solve literal equations and a system of two linear equations. They are developing an understanding of linear functions and their graphs, as well as functional notation, including the composition of functions. They can determine the nth term of a sequence and give counterexamples to disprove an algebraic generalization.

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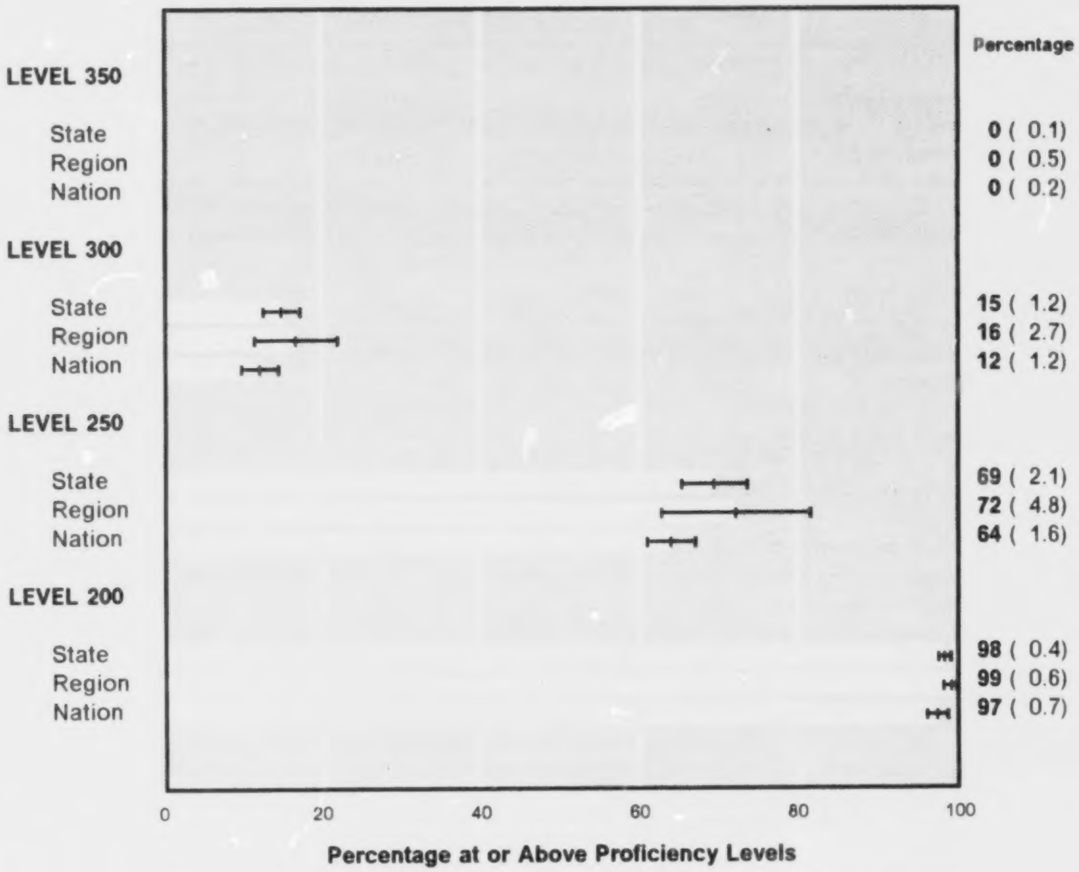
FIGURE 4 | **Levels of Eighth-Grade Public-School Mathematics Proficiency**



The standard errors are presented in parentheses. With about 95 percent certainty, the value for each population of interest is within ± 2 standard errors of the estimated percentage (95 percent confidence interval, denoted by ⊢+⊣). If the confidence intervals for the populations do not overlap, there is a statistically significant difference between the populations.

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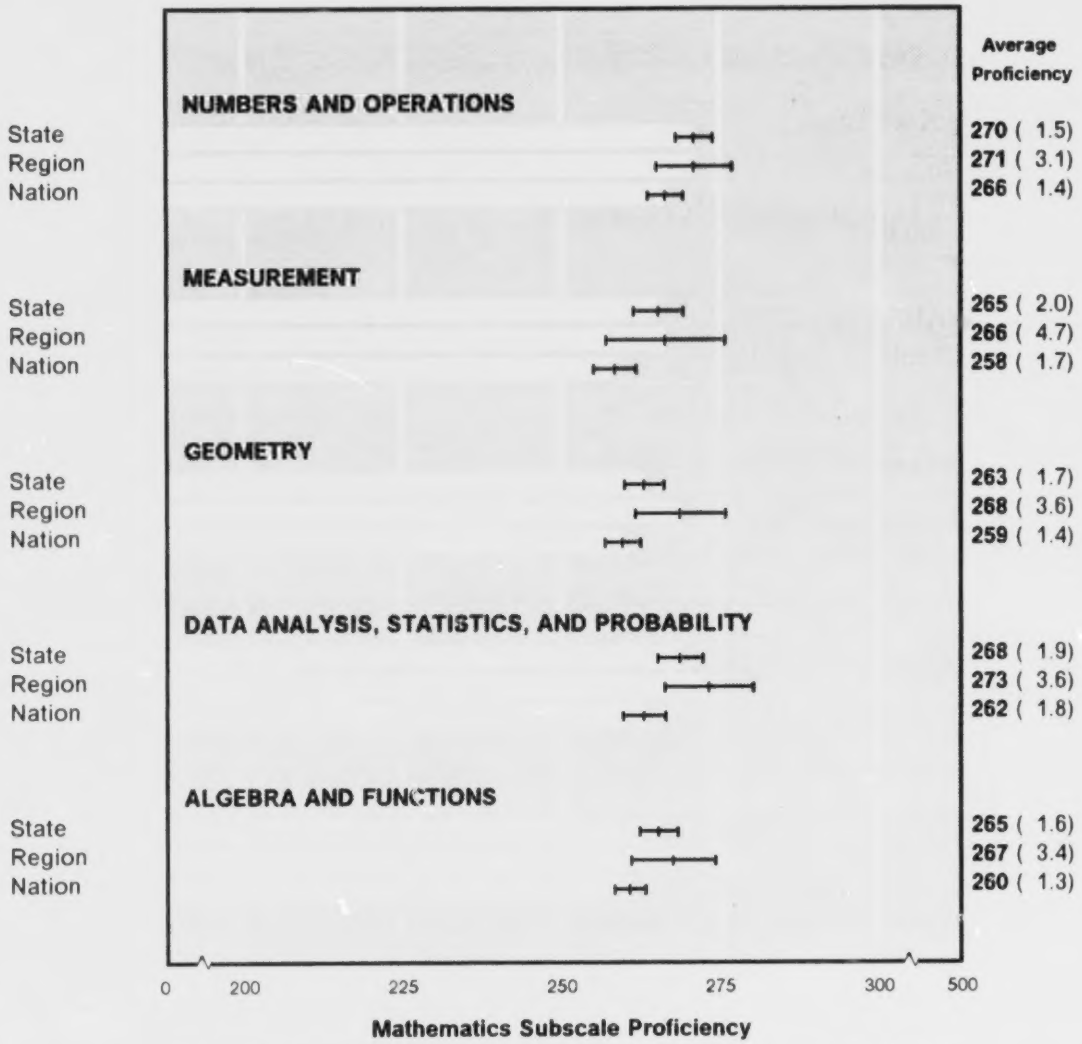
FIGURE 5 | **Eighth-Grade Public-School Mathematics Content Area Performance**



The standard errors are presented in parentheses. With about 95 percent certainty, the average mathematics proficiency for each population of interest is within ± 2 standard errors of the estimated mean (95 percent confidence interval, denoted by ⊢+⊣). If the confidence intervals for the populations do not overlap, there is a statistically significant difference between the populations.

CHAPTER 2

Mathematics Performance by Subpopulations

In addition to the overall state results, the 1990 Trial State Assessment included reporting on the performance of various subgroups of the student population defined by race/ethnicity, type of community, parents' education level, and gender.

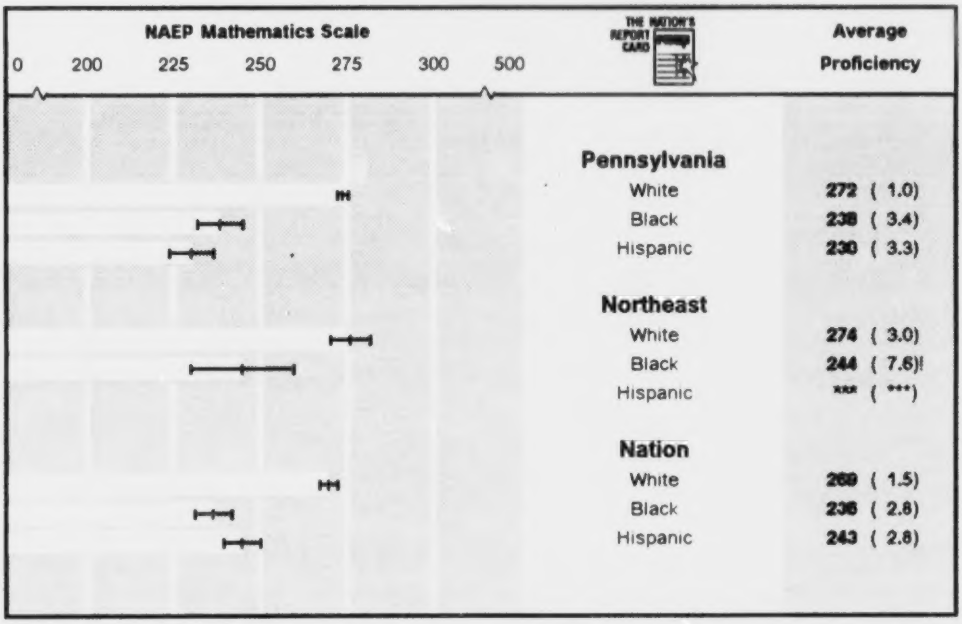
RACE/ETHNICITY

The Trial State Assessment results can be compared according to the different racial/ethnic groups when the number of students in a racial/ethnic group is sufficient in size to be reliably reported (at least 62 students). Average mathematics performance results for **White, Black, and Hispanic** students from Pennsylvania are presented in Figure 6.

As shown in Figure 6, White students demonstrated higher average mathematics proficiency than did Black or Hispanic students.

Figure 7 presents mathematics performance by proficiency levels. The figure shows that a greater percentage of White students than Black or Hispanic students attained level 300.

FIGURE 6 | **Average Eighth-Grade Public-School Mathematics Proficiency by Race/Ethnicity**



	Average Proficiency
Pennsylvania	
White	**272** (1.0)
Black	**238** (3.4)
Hispanic	**230** (3.3)
Northeast	
White	**274** (3.0)
Black	**244** (7.6)!
Hispanic	*** (***)
Nation	
White	**269** (1.5)
Black	**236** (2.8)
Hispanic	**243** (2.8)

The standard errors are presented in parentheses. With about 95 percent certainty, the average mathematics proficiency for each population of interest is within ± 2 standard errors of the estimated mean (95 percent confidence interval, denoted by ├─┼─┤). If the confidence intervals for the populations do not overlap, there is a statistically significant difference between the populations. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

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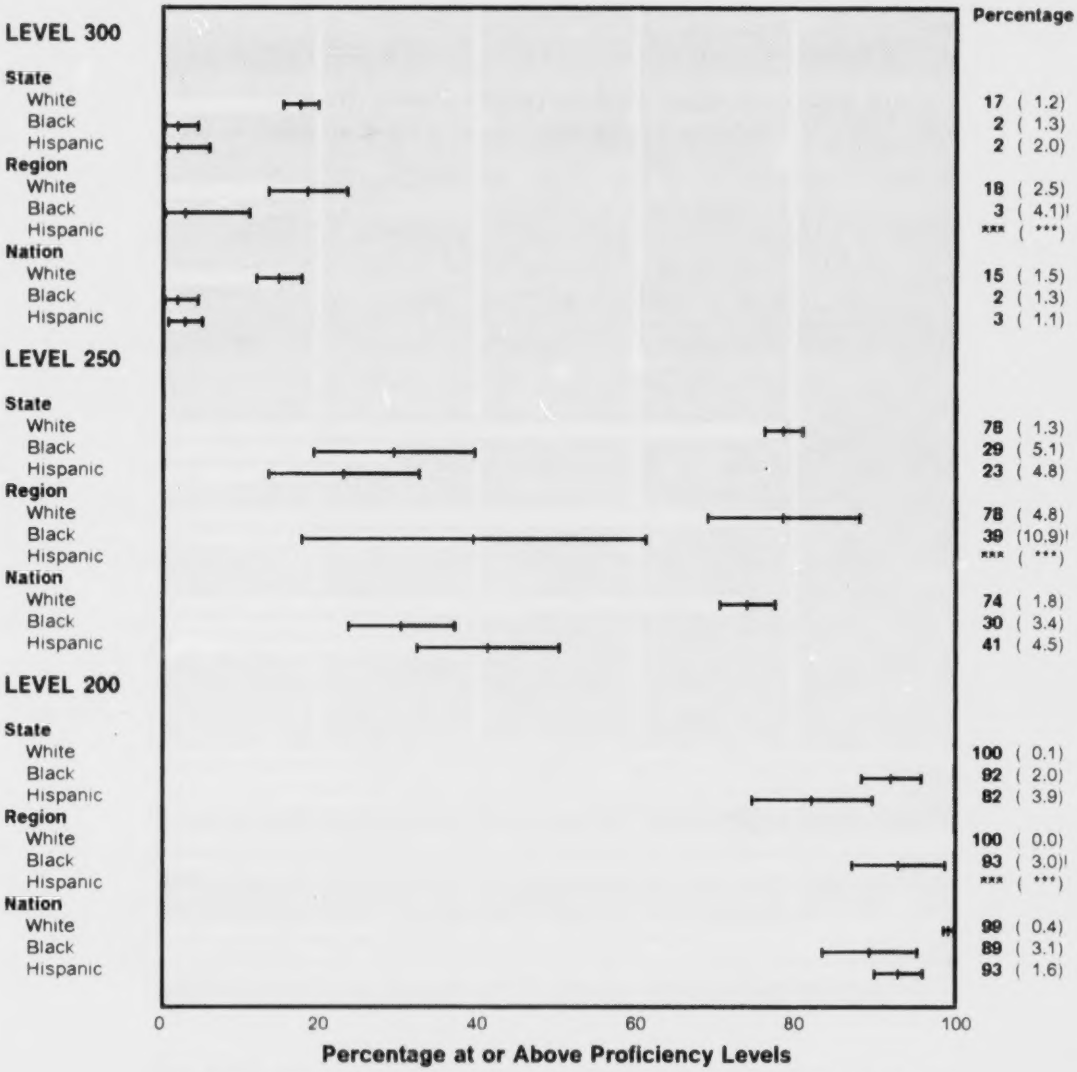
FIGURE 7 | **Levels of Eighth-Grade Public-School Mathematics Proficiency by Race/Ethnicity**



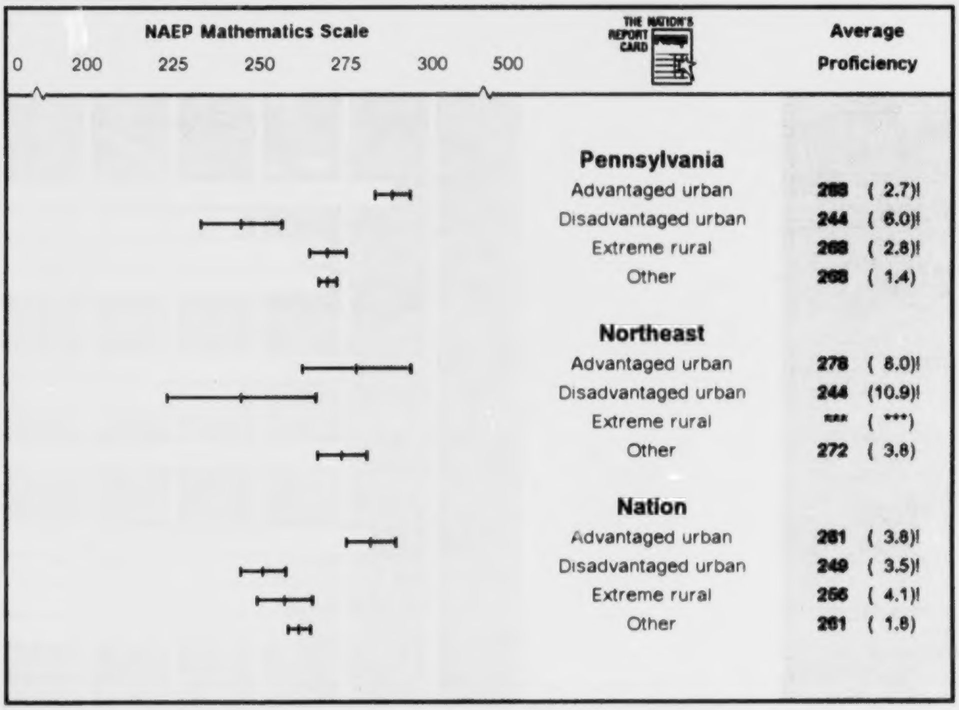
The standard errors are presented in parentheses. With about 95 percent certainty, the value for each population of interest is within ± 2 standard errors of the estimated percentage (95 percent confidence interval, denoted by ⊢+⊣). If the confidence intervals for the populations do not overlap, there is a statistically significant difference between the populations. Proficiency level 350 is not presented in this figure because so few students attained that level. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TYPE OF COMMUNITY

Figure 8 and Figure 9 present the mathematics proficiency results for eighth-grade students attending public schools in **advantaged urban areas, disadvantaged urban areas, extreme rural areas, and areas classified as "other"**. (These are the "type of community" groups in Pennsylvania with student samples large enough to be reliably reported.) The results indicate that the average mathematics performance of the Pennsylvania students attending schools in advantaged urban areas was higher than that of students attending schools in disadvantaged urban areas, extreme rural areas, or areas classified as "other".

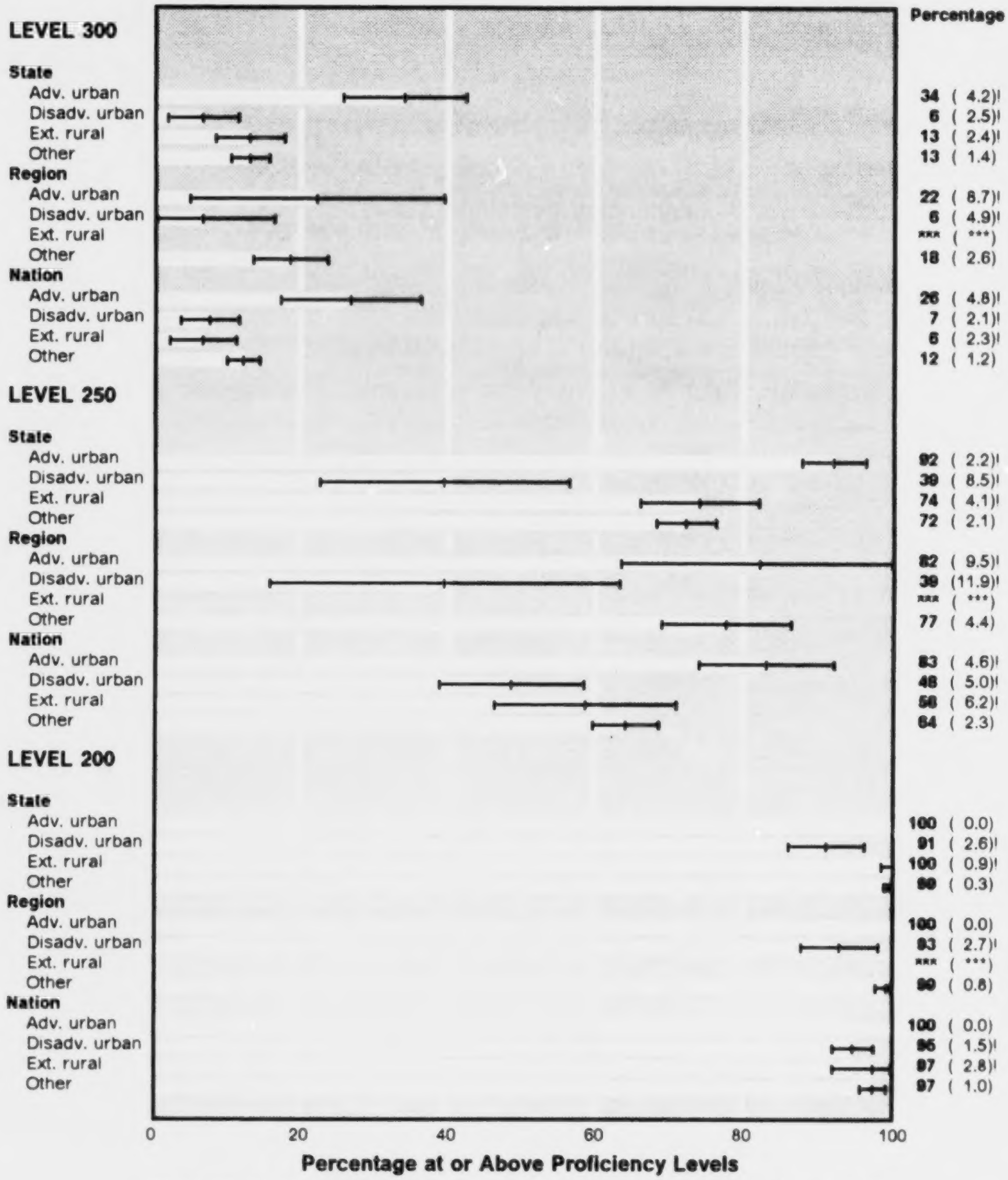
FIGURE 8

Average Eighth-Grade Public-School Mathematics Proficiency by Type of Community



The standard errors are presented in parentheses. With about 95 percent certainty, the average mathematics proficiency for each population of interest is within ± 2 standard errors of the estimated mean (95 percent confidence interval, denoted by ├┼┤). If the confidence intervals for the populations do not overlap, there is a statistically significant difference between the populations. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

FIGURE 9 | **Levels of Eighth-Grade Public-School Mathematics Proficiency by Type of Community**

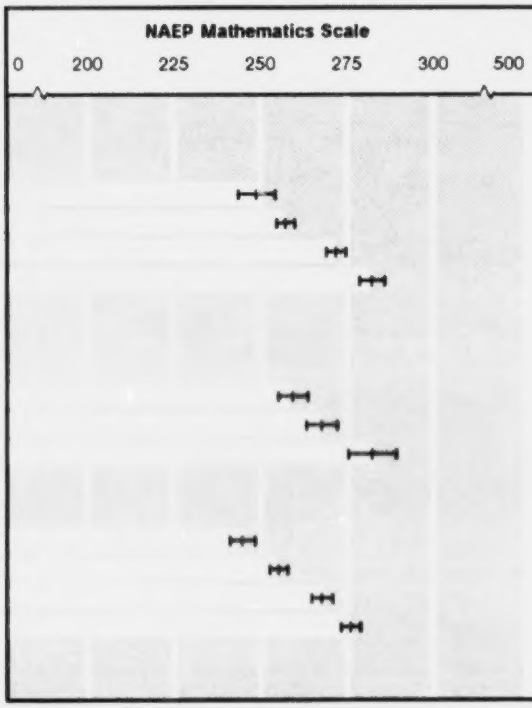


The standard errors are presented in parentheses. With about 95 percent certainty, the value for each population of interest is within ± 2 standard errors of the estimated percentage (95 percent confidence interval, denoted by ⊢+⊣). If the confidence intervals for the populations do not overlap, there is a statistically significant difference between the populations. Proficiency level 350 is not presented in this figure because so few students attained that level. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

PARENTS' EDUCATION LEVEL

Previous NAEP findings have shown that students whose parents are better educated tend to have higher mathematics proficiency (see Figures 10 and 11). In Pennsylvania, the average mathematics proficiency of eighth-grade public-school students having at least one parent who graduated from college was approximately 33 points higher than that of students who reported that neither parent graduated from high school. As shown in Table 1 in the Introduction, about the same percentage of students in Pennsylvania (35 percent) and in the nation (39 percent) had at least one parent who graduated from college. In comparison, the percentage of students who reported that neither parent graduated from high school was 6 percent for Pennsylvania and 10 percent for the nation.

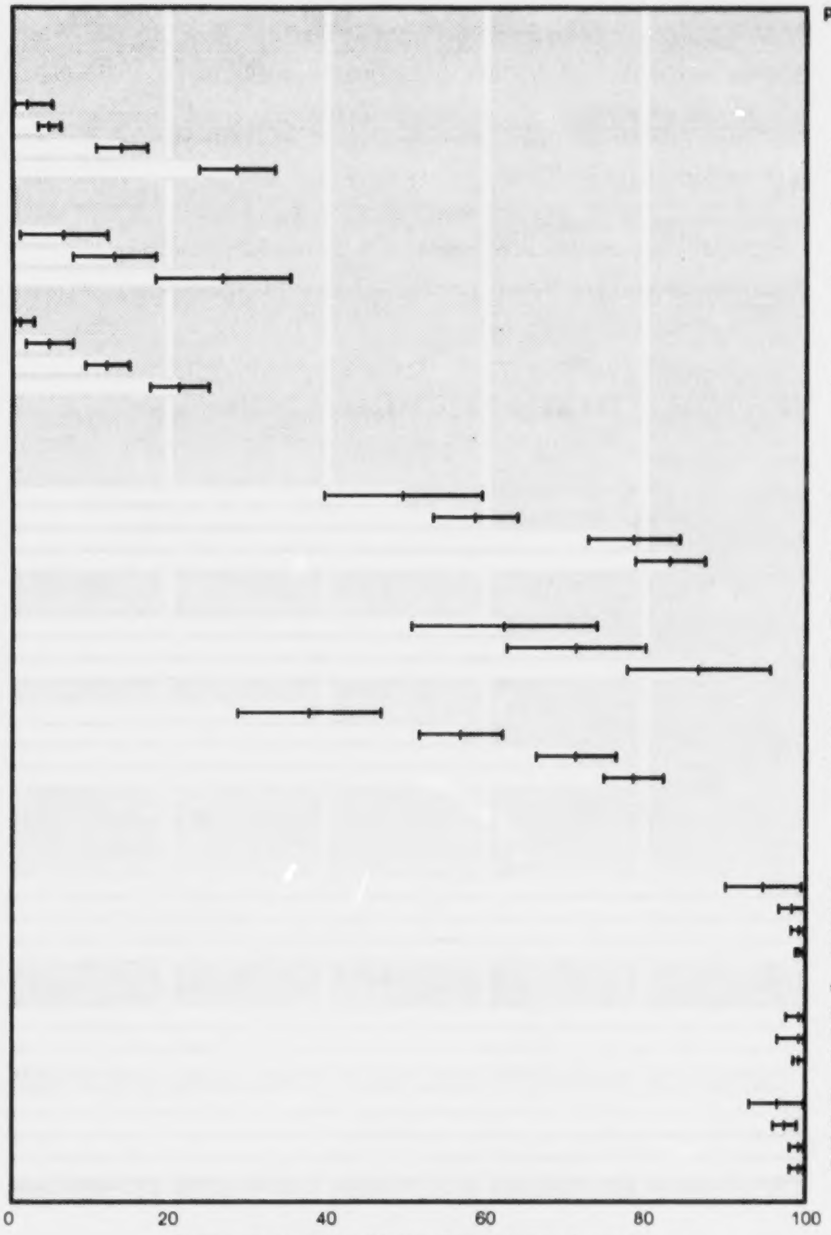
FIGURE 10 | **Average Eighth-Grade Public-School Mathematics Proficiency by Parents' Education**



	Average Proficiency
Pennsylvania	
HS non-graduate	**247** (2.8)
HS graduate	**256** (1.5)
Some college	**271** (1.5)
College graduate	**281** (1.9)
Northeast	
HS non-graduate	*** (***)
HS graduate	**258** (2.3)
Some college	**266** (2.4)
College graduate	**282** (3.6)
Nation	
HS non-graduate	**243** (2.0)
HS graduate	**254** (1.5)
Some college	**266** (1.7)
College graduate	**274** (1.6)

The standard errors are presented in parentheses. With about 95 percent certainty, the average mathematics proficiency for each population of interest is within ± 2 standard errors of the estimated mean (95 percent confidence interval, denoted by ⊢+⊣). If the confidence intervals for the populations do not overlap, there is a statistically significant difference between the populations. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

FIGURE 11 | Levels of Eighth-Grade Public-School Mathematics Proficiency by Parents' Education



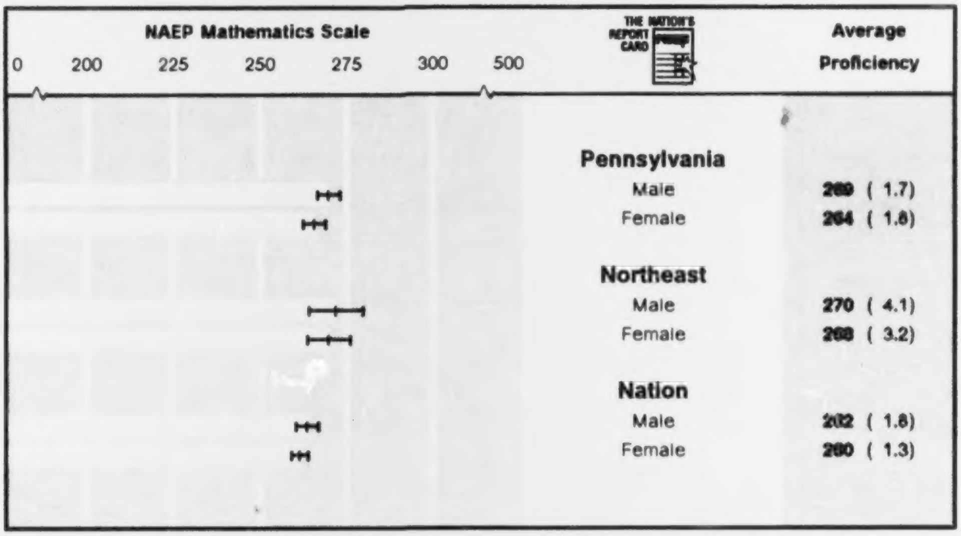
	Percentage
LEVEL 300	
State	
HS non-grad.	2 (1.6)
HS graduate	5 (0.8)
Some college	14 (1.7)
College grad.	28 (2.4)
Region	
HS non-grad.	*** (***)
HS graduate	6 (2.8)
Some college	13 (2.7)
College grad.	26 (4.3)
Nation	
HS non-grad.	1 (0.9)
HS graduate	5 (1.5)
Some college	12 (1.4)
College grad.	21 (1.9)
LEVEL 250	
State	
HS non-grad.	49 (5.0)
HS graduate	58 (2.7)
Some college	78 (3.0)
College grad.	83 (2.3)
Region	
HS non-grad.	*** (***)
HS graduate	62 (5.9)
Some college	71 (4.5)
College grad.	86 (4.6)
Nation	
HS non-grad.	37 (4.6)
HS graduate	56 (2.7)
Some college	71 (2.6)
College grad.	78 (2.0)
LEVEL 200	
State	
HS non-grad.	95 (2.4)
HS graduate	98 (0.9)
Some college	99 (0.6)
College grad.	99 (0.3)
Region	
HS non-grad.	*** (***)
HS graduate	99 (0.9)
Some college	99 (1.4)
College grad.	99 (0.4)
Nation	
HS non-grad.	96 (1.9)
HS graduate	97 (0.8)
Some college	99 (0.7)
College grad.	99 (0.7)

The standard errors are presented in parentheses. With about 95 percent certainty, the value for each population of interest is within ± 2 standard errors of the estimated percentage (95 percent confidence interval, denoted by ⊢+⊣). If the confidence intervals for the populations do not overlap, there is a statistically significant difference between the populations. Proficiency level 350 is not presented in this figure because so few students attained that level.
*** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

GENDER

As shown in Figure 12, eighth-grade males in Pennsylvania had a higher average mathematics proficiency than did eighth-grade females in Pennsylvania. Compared to the national results, females in Pennsylvania performed no differently from females across the country; males in Pennsylvania performed higher than males across the country.

FIGURE 12 | **Average Eighth-Grade Public-School Mathematics Proficiency by Gender**

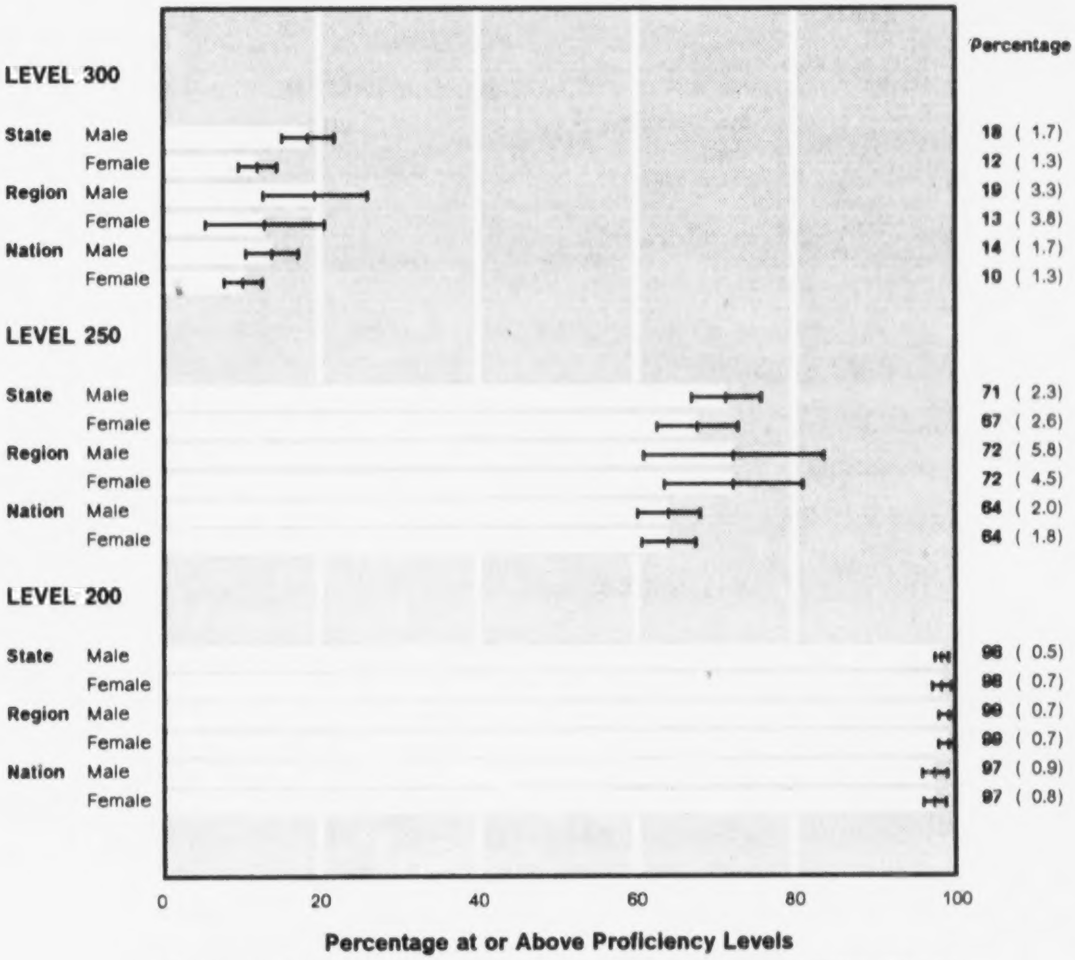


	Average Proficiency
Pennsylvania	
Male	**269** (1.7)
Female	**264** (1.6)
Northeast	
Male	**270** (4.1)
Female	**268** (3.2)
Nation	
Male	**262** (1.6)
Female	**260** (1.3)

The standard errors are presented in parentheses. With about 95 percent certainty, the average mathematics proficiency for each population of interest is within ± 2 standard errors of the estimated mean (95 percent confidence interval, denoted by ⊢+⊣). If the confidence intervals for the populations do not overlap, there is a statistically significant difference between the populations.

As shown in Figure 13, there was no difference between the percentages of males and females in Pennsylvania who attained level 200. The percentage of females in Pennsylvania who attained level 200 was similar to the percentage of females in the nation who attained level 200. Also, the percentage of males in Pennsylvania who attained level 200 was similar to the percentage of males in the nation who attained level 200.

FIGURE 13 | Levels of Eighth-Grade Public-School Mathematics Proficiency by Gender



The standard errors are presented in parentheses. With about 95 percent certainty, the value for each population of interest is within ± 2 standard errors of the estimated percentage (95 percent confidence interval, denoted by ⊢+⊣). If the confidence intervals for the populations do not overlap, there is a statistically significant difference between the populations. Proficiency level 350 is not presented in this figure because so few students attained that level.

In addition, a greater percentage of males than females in Pennsylvania attained level 300. The percentage of females in Pennsylvania who attained level 300 was similar to the percentage of females in the nation who attained level 300. Also, the percentage of males in Pennsylvania who attained level 300 was similar to the percentage of males in the nation who attained level 300.

CONTENT AREA PERFORMANCE

Table 3 provides a summary of content area performance by race/ethnicity, type of community, parents' education level, and gender.

TABLE 3 | Eighth-Grade Public-School Mathematics Content Area Performance by Subpopulations

AVERAGE MATHEMATICS PROFICIENCY OF STUDENTS

1990 NAEP TRIAL STATE ASSESSMENT	Numbers and Operations	Measurement	Geometry	Data Analysis, Statistics, and Probability	Algebra and Functions
	Proficiency	Proficiency	Proficiency	Proficiency	Proficiency
TOTAL					
State	270 (1.5)	265 (2.0)	263 (1.7)	268 (1.9)	265 (1.6)
Region	271 (3.1)	266 (4.7)	268 (3.6)	273 (3.6)	267 (3.4)
Nation	266 (1.4)	258 (1.7)	259 (1.4)	262 (1.8)	260 (1.3)
RACE/ETHNICITY					
White					
State	275 (1.0)	272 (1.4)	269 (1.0)	274 (1.2)	270 (1.2)
Region	275 (3.1)	272 (4.6)	272 (3.1)	279 (3.1)	271 (3.0)
Nation	273 (1.6)	267 (2.0)	267 (1.5)	272 (1.8)	268 (1.4)
Black					
State	246 (3.4)	231 (4.7)	232 (3.5)	234 (4.1)	239 (3.7)
Region	250 (5.4)!	233 (9.4)!	243 (9.9)!	244 (8.2)!	242 (9.2)!
Nation	244 (3.1)	227 (3.6)	234 (2.8)	231 (3.8)	237 (2.7)
Hispanic					
State	237 (3.1)	219 (6.2)	231 (4.0)	228 (4.0)	226 (3.9)
Region	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Nation	248 (2.7)	238 (3.4)	243 (3.2)	239 (3.4)	243 (3.1)
TYPE OF COMMUNITY					
Advantaged urban					
State	291 (2.2)!	290 (4.3)!	284 (3.2)!	292 (2.8)!	286 (2.8)!
Region	282 (6.5)!	279 (6.8)!	275 (9.6)!	282 (8.5)!	273 (10.1)!
Nation	283 (3.2)!	281 (3.2)!	277 (5.2)!	285 (4.8)!	277 (4.8)!
Disadvantaged urban					
State	250 (5.3)!	237 (7.9)!	242 (6.2)!	242 (6.5)!	245 (5.9)!
Region	251 (7.2)!	236 (13.6)!	242 (13.5)!	245 (11.8)!	243 (12.6)!
Nation	255 (3.1)!	242 (4.9)!	248 (3.7)!	247 (4.6)!	247 (3.2)!
Extreme rural					
State	270 (2.7)!	269 (4.2)!	267 (3.7)!	271 (2.7)!	266 (3.8)!
Region	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Nation	258 (4.3)!	254 (4.2)!	253 (4.5)!	257 (5.0)!	256 (4.8)!
Other					
State	270 (1.4)	266 (1.9)	265 (1.5)	269 (1.8)	266 (1.5)
Region	274 (3.7)	268 (6.5)	272 (3.3)	277 (3.9)	271 (3.4)
Nation	266 (1.9)	257 (2.4)	259 (1.7)	261 (2.2)	261 (1.7)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE 3
(continued)

Eighth-Grade Public-School Mathematics Content Area Performance by Subpopulations

AVERAGE MATHEMATICS PROFICIENCY OF STUDENTS

1990 NAEP TRIAL STATE ASSESSMENT	Numbers and Operations	Measurement	Geometry	Data Analysis, Statistics, and Probability	Algebra and Functions
	Proficiency	**Proficiency**	**Proficiency**	**Proficiency**	**Proficiency**
TOTAL					
State	270 (1.5)	265 (2.0)	263 (1.7)	268 (1.9)	265 (1.6)
Region	271 (3.1)	268 (4.7)	268 (3.6)	273 (3.6)	267 (3.4)
Nation	266 (1.4)	256 (1.7)	259 (1.4)	262 (1.8)	260 (1.3)
PARENTS' EDUCATION					
HS non-graduate					
State	253 (2.9)	242 (4.3)	247 (2.9)	244 (3.4)	245 (3.2)
Region	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Nation	247 (2.4)	237 (3.6)	242 (2.2)	240 (3.1)	242 (3.0)
HS graduate					
State	260 (1.5)	253 (2.2)	254 (1.9)	257 (1.8)	254 (1.5)
Region	260 (2.7)	255 (5.1)	258 (3.2)	264 (4.6)	254 (2.9)
Nation	259 (1.8)	248 (2.1)	252 (1.6)	253 (2.2)	253 (2.0)
Some college					
State	273 (1.5)	269 (2.4)	269 (2.1)	272 (1.8)	269 (1.6)
Region	267 (2.3)	261 (5.7)	267 (3.4)	273 (3.4)	262 (2.9)
Nation	270 (1.5)	264 (2.7)	262 (2.0)	269 (2.4)	263 (2.2)
College graduate					
State	283 (1.9)	281 (2.7)	276 (1.9)	284 (2.4)	279 (2.1)
Region	285 (3.8)	279 (5.5)	277 (3.8)	287 (3.5)	280 (3.6)
Nation	278 (1.8)	272 (2.0)	270 (1.6)	276 (2.2)	273 (1.7)
GENDER					
Male					
State	272 (1.7)	271 (2.3)	266 (1.8)	271 (2.0)	265 (1.9)
Region	272 (3.9)	271 (5.9)	269 (4.0)	274 (4.1)	266 (4.1)
Nation	266 (2.0)	262 (2.3)	260 (1.7)	262 (2.1)	260 (1.6)
Female					
State	267 (1.6)	258 (2.2)	261 (1.8)	264 (2.1)	264 (1.8)
Region	270 (3.1)	261 (4.3)	266 (4.1)	273 (3.6)	268 (3.7)
Nation	266 (1.4)	253 (1.6)	258 (1.5)	261 (1.9)	260 (1.4)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

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PART TWO

Finding a Context for Understanding Students' Mathematics Proficiency

Information on students' mathematics proficiency is valuable in and of itself, but it becomes more useful for improving instruction and setting policy when supplemented with contextual information about schools, teachers, and students.

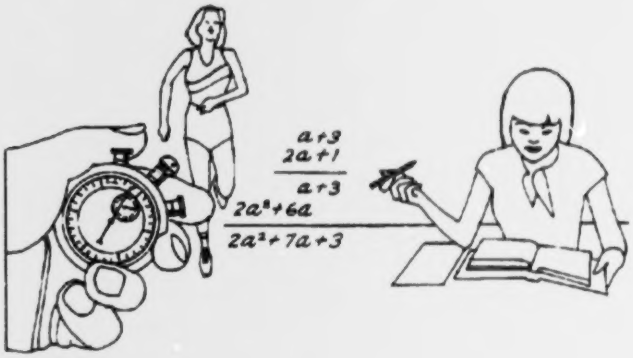
To gather such information, the students participating in the 1990 Trial State Assessment, their mathematics teachers, and the principals or other administrators in their schools were asked to complete questionnaires on policies, instruction, and programs. Taken together, the student, teacher, and school data help to describe some of the current practices and emphases in mathematics education, illuminate some of the factors that appear to be related to eighth-grade public-school students' proficiency in the subject, and provide an educational context for understanding information on student achievement. It is important to note that the NAEP data cannot establish cause-and-effect links between various contextual factors and students' mathematics proficiency. However, the results do provide information about important relationships between the contextual factors and proficiency.

The contextual information provided in Part Two of this report focuses on four major areas: instructional content, instructional practices, teacher qualifications, and conditions beyond school that facilitate learning and instruction -- fundamental aspects of the educational process in the country.

Through the questionnaires administered to students, teachers, and principals, NAEP is able to provide a broad picture of educational practices prevalent in American schools and classrooms. In many instances, however, these findings contradict our perceptions of what school is like or educational researchers' suggestions about what strategies work best to help students learn.

For example, research has indicated new and more successful ways of teaching and learning, incorporating more hands-on activities and student-centered learning techniques; however, as described in Chapter 4, NAEP data indicate that classroom work is still dominated by textbooks or worksheets. Also, it is widely recognized that home environment has an enormous impact on future academic achievement. Yet, as shown in Chapters 3 and 7, large proportions of students report having spent much more time each day watching television than doing mathematics homework.

Part Two consists of five chapters. Chapter 3 discusses instructional content and its relationship to students' mathematics proficiency. Chapter 4 focuses on instructional practices -- how instruction is delivered. Chapter 5 is devoted to calculator use. Chapter 6 provides information about teachers, and Chapter 7 examines students' home support for learning.



CHAPTER 3

What Are Students Taught in Mathematics?

In response to the continuing swell of information about the poor mathematics achievement of American students, educators and policymakers have recommended widespread reforms that are changing the direction of mathematics education. Recent reports have called for fundamental revisions in curriculum, a reexamination of tracking practices, improved textbooks, better assessment, and an increase in the proportions of students in high-school mathematics programs.[3] This chapter focuses on curricular and instructional content issues in Pennsylvania public schools and their relationship to students' proficiency.

Table 4 provides a profile of the eighth-grade public schools' policies and staffing. Some of the salient results are as follows:

- About three-quarters of the eighth-grade students in Pennsylvania (74 percent) were in public schools where mathematics was identified as a special priority. This compares to 63 percent for the nation.

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[3] Curtis McKnight, et al., *The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective*, A National Report on the Second International Mathematics Study (Champaign, IL: Stipes Publishing Company, 1987).

Lynn Steen, Ed. *Everybody Counts: A Report to the Nation on the Future of Mathematics Education* (Washington, DC: National Academy Press, 1989).

- In Pennsylvania, 88 percent of the students could take an algebra course in eighth grade for high school course placement or credit.
- Almost all of the students in Pennsylvania (94 percent) were taught mathematics by teachers who teach only one subject.
- Many (81 percent) of the students in Pennsylvania were typically taught mathematics in a class that was grouped by mathematics ability. Ability grouping was less prevalent across the nation (63 percent).

TABLE 4 | Mathematics Policies and Practices in Pennsylvania Eighth-Grade Public Schools

PERCENTAGE OF STUDENTS

1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
	Percentage	**Percentage**	**Percentage**
Percentage of eighth-grade students in public schools that identified **mathematics as receiving special emphasis** in school-wide goals and objectives, instruction, in-service training, etc.	74 (4.5)	45 (16.5)	63 (5.9)
Percentage of eighth-grade public-school students who are **offered a course in algebra** for high school course placement or credit	88 (3.6)	90 (7.3)	78 (4.6)
Percentage of eighth-grade students in public schools who are taught by **teachers who teach only mathematics**	94 (2.1)	100 (0.0)	91 (3.3)
Percentage of eighth-grade students in public schools who are **assigned to a mathematics class by their ability** in mathematics	81 (3.1)	71 (10.1)	63 (4.0)
Percentage of eighth-grade students in public schools who receive **four or more hours of mathematics instruction per week**	20 (3.4)	14 (5.5)	30 (4.4)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample.

CURRICULUM COVERAGE

To place students' mathematics proficiency in a curriculum-related context, it is necessary to examine the extent to which eighth graders in Pennsylvania are taking mathematics courses. Based on their responses, shown in Table 5:

- About the same percentage of students in Pennsylvania were taking eighth-grade mathematics (49 percent) as were taking a course in pre-algebra or algebra (48 percent). Across the nation, 62 percent were taking eighth-grade mathematics and 34 percent were taking a course in pre-algebra or algebra.
- Students in Pennsylvania who were enrolled in pre-algebra or algebra courses exhibited higher average mathematics proficiency than did those who were in eighth-grade mathematics courses. This result is not unexpected since it is assumed that students enrolled in pre-algebra and algebra courses may be the more able students who have already mastered the general eighth-grade mathematics curriculum.

TABLE 5

Students' Reports on the Mathematics Class They Are Taking

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
What kind of mathematics class are you taking this year?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
Eighth-grade mathematics	49 (2.5) 248 (1.6)	63 (5.8) 259 (2.9)	62 (2.1) 251 (1.4)
Pre-algebra	24 (2.2) 275 (1.5)	16 (3.9) 278 (6.7)!	19 (1.9) 272 (2.4)
Algebra	25 (1.6) 296 (1.4)	18 (3.3) 297 (3.6)	15 (1.2) 296 (2.4)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. The percentages may not total 100 percent because a small number of students reported taking other mathematics courses. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency.

Further, from Table A5 in the Data Appendix:[4]

- About the same percentage of females (48 percent) and males (49 percent) in Pennsylvania were enrolled in pre-algebra or algebra courses.
- In Pennsylvania, 52 percent of White students, 32 percent of Black students, and 29 percent of Hispanic students were enrolled in pre-algebra or algebra courses.
- Similarly, 64 percent of students attending schools in advantaged urban areas, 32 percent in schools in disadvantaged urban areas, 49 percent in schools in extreme rural areas, and 49 percent in schools in areas classified as "other" were enrolled in pre-algebra or algebra courses.

MATHEMATICS HOMEWORK

To illuminate the relationship between homework and proficiency in mathematics, the assessed students and their teachers were asked to report the amount of time the students spent on mathematics homework each day. Tables 6 and 7 report the teachers' and students' responses, respectively.

According to their teachers, the greatest percentage of eighth-grade students in public schools in Pennsylvania spent either 15 or 30 minutes doing mathematics homework each day; according to the students, the greatest percentage spent 15 minutes doing mathematics homework each day. Across the nation, according to their teachers, the largest percentage of students spent either 15 or 30 minutes doing mathematics homework each day, while students reported spending either 15 or 30 minutes daily.

Further, as reported by their **teachers** (Table 6 and Table A6 in the Data Appendix):

- In Pennsylvania, 2 percent of the students spent no time each day on mathematics homework, compared to 1 percent for the nation. Moreover, 2 percent of the students in Pennsylvania and 4 percent of the students in the nation spent an hour or more on mathematics homework each day.

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[4] For every table in the body of the report that includes estimates of average proficiency, the Data Appendix provides a corresponding table presenting the results for the four subpopulations -- race/ethnicity, type of community, parents' education level, and gender.

- The results by race/ethnicity show that 2 percent of White students, 0 percent of Black students, and 0 percent of Hispanic students spent an hour or more on mathematics homework each day. In comparison, 1 percent of White students, 5 percent of Black students, and 8 percent of Hispanic students spent no time doing mathematics homework.
- In addition, 0 percent of students attending schools in advantaged urban areas, 0 percent in schools in disadvantaged urban areas, 0 percent in schools in extreme rural areas, and 2 percent in schools in areas classified as "other" spent an hour or more on mathematics homework daily. In comparison, 1 percent of students attending schools in advantaged urban areas, 5 percent in schools in disadvantaged urban areas, 1 percent in schools in extreme rural areas, and 2 percent in schools in areas classified as "other" spent no time doing mathematics homework.

TABLE 6

Teachers' Reports on the Amount of Time Students Spent on Mathematics Homework Each Day

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
About how much time do students spend on mathematics homework each day?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
None	2 (0.7) *** (***)	0 (0.0) *** (***)	1 (0.3) *** (***)
15 minutes	41 (2.9) 258 (1.9)	54 (13.2) 264 (4.7)!	43 (4.2) 256 (2.3)
30 minutes	44 (3.2) 274 (2.4)	35 (12.5) 270 (4.1)!	43 (4.3) 266 (2.6)
45 minutes	12 (2.2) 274 (7.0)	9 (2.7) *** (***)	10 (1.9) 272 (5.7)!
An hour or more	2 (0.8) *** (***)	3 (0.6) *** (***)	4 (0.9) 278 (5.1)!

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE 7 | Students' Reports on the Amount of Time They Spent on Mathematics Homework Each Day

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
About how much time do you usually spend each day on mathematics homework?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
None	5 (0.5) 249 (3.5)	6 (1.2) *** (***)	9 (0.8) 251 (2.8)
15 minutes	41 (1.1) 268 (1.6)	37 (3.3) 269 (2.4)	31 (2.0) 264 (1.9)
30 minutes	35 (0.7) 269 (1.9)	34 (2.6) 271 (6.0)	32 (1.2) 263 (1.9)
45 minutes	11 (0.7) 264 (2.8)	15 (2.3) 272 (6.5)	16 (1.0) 266 (1.9)
An hour or more	8 (0.6) 265 (3.1)	8 (1.7) *** (***)	12 (1.1) 258 (3.1)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

And, according to the **students** (Table 7 and Table A7 in the Data Appendix):

- In Pennsylvania, relatively few of the students (5 percent) reported that they spent no time each day on mathematics homework, compared to 9 percent for the nation. Moreover, 8 percent of the students in Pennsylvania and 12 percent of students in the nation spent an hour or more each day on mathematics homework.

- The results by race/ethnicity show that 7 percent of White students, 11 percent of Black students, and 7 percent of Hispanic students spent an hour or more on mathematics homework each day. In comparison, 5 percent of White students, 5 percent of Black students, and 9 percent of Hispanic students spent no time doing mathematics homework.

- In addition, 6 percent of students attending schools in advantaged urban areas, 9 percent in schools in disadvantaged urban areas, 7 percent in schools in extreme rural areas, and 8 percent in schools in areas classified as "other" spent an hour or more on mathematics homework daily. In comparison, 2 percent of students attending schools in advantaged urban areas, 4 percent in schools in disadvantaged urban areas, 5 percent in schools in extreme rural areas, and 6 percent in schools in areas classified as "other" spent no time doing mathematics homework.

INSTRUCTIONAL EMPHASIS

According to the approach of the National Council of Teachers of Mathematics (NCTM), students should be taught a broad range of mathematics topics, including number concepts, computation, estimation, functions, algebra, statistics, probability, geometry, and measurement.[5] Because the Trial State Assessment questions were designed to measure students' knowledge, skills, and understandings in these various content areas -- regardless of the type of mathematics class in which they were enrolled -- the teachers of the assessed students were asked a series of questions about the emphasis they planned to give specific mathematics topics during the school year. Their responses provide an indication of the students' opportunity to learn the various topics covered in the assessment.

For each of 10 topics, the teachers were asked whether they planned to place "heavy," "moderate," or "little or no" emphasis on the topic. Each of the topics corresponded to skills that were measured in one of the five mathematics content areas included in the Trial State Assessment:

- **Numbers and Operations**. Teachers were asked about emphasis placed on five topics: whole number operations, common fractions, decimal fractions, ratio or proportion, and percent.
- **Measurement**. Teachers were asked about emphasis placed on one topic: measurement.
- **Geometry**. Teachers were asked about emphasis placed on one topic: geometry.
- **Data Analysis, Statistics, and Probability**. Teachers were asked about emphasis placed on two topics: tables and graphs, and probability and statistics.
- **Algebra and Functions**. Teachers were asked about emphasis placed on one topic: algebra and functions.

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[5] National Council of Teachers of Mathematics, *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

The responses of the assessed students' teachers to the topic emphasis questions for each content area were combined to create a new variable. For each question in a particular content area, a value of 3 was given to "heavy emphasis" responses, 2 to "moderate emphasis" responses, and 1 to "little or no emphasis" responses. Each teacher's responses were then averaged over all questions related to the particular content area.

Table 8 provides the results for the extreme categories -- "heavy emphasis" and "little or no emphasis" -- and the average student proficiency in each content area. For the emphasis questions about numbers and operations, for example, the proficiency reported is the average student performance in the Numbers and Operations content area.

Students whose teachers placed heavy instructional emphasis on Algebra and Functions had higher proficiency in this content area than students whose teachers placed little or no emphasis on Algebra and Functions. Students whose teachers placed heavy instructional emphasis on Numbers and Operations and Measurement had lower proficiency in these content areas than students whose teachers placed little or no emphasis on the same areas.

TABLE 8 | Teachers' Reports on the Emphasis Given to Specific Mathematics Content Areas

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
Teacher "emphasis" categories by content areas	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
Numbers and Operations			
Heavy emphasis	47 (3.0) 260 (1.7)	41 (6.9) 268 (2.9)	49 (3.8) 260 (1.8)
Little or no emphasis	19 (2.3) 293 (3.9)	21 (6.5) *** (***)	15 (2.1) 287 (3.4)
Measurement			
Heavy emphasis	15 (2.2) 252 (3.7)	32 (11.5) 257 (11.7)!	17 (3.0) 250 (5.6)
Little or no emphasis	43 (2.9) 276 (3.9)	34 (8.3) 282 (4.8)!	33 (4.0) 272 (4.0)
Geometry			
Heavy emphasis	17 (2.7) 259 (2.6)	46 (11.9) 264 (6.1)!	28 (3.8) 260 (3.2)
Little or no emphasis	34 (3.0) 270 (4.3)	9 (1.9) *** (***)	21 (3.3) 264 (5.4)
Data Analysis, Statistics, and Probability			
Heavy emphasis	6 (1.1) 266 (3.5)	12 (6.1) *** (***)	14 (2.2) 269 (4.3)
Little or no emphasis	77 (2.6) 269 (2.4)	46 (10.1) 279 (5.4)!	53 (4.4) 261 (2.9)
Algebra and Functions			
Heavy emphasis	48 (2.8) 283 (1.9)	52 (11.5) 273 (8.6)!	46 (3.6) 275 (2.5)
Little or no emphasis	20 (2.3) 237 (2.6)	14 (6.6) *** (***)	20 (3.0) 243 (3.0)

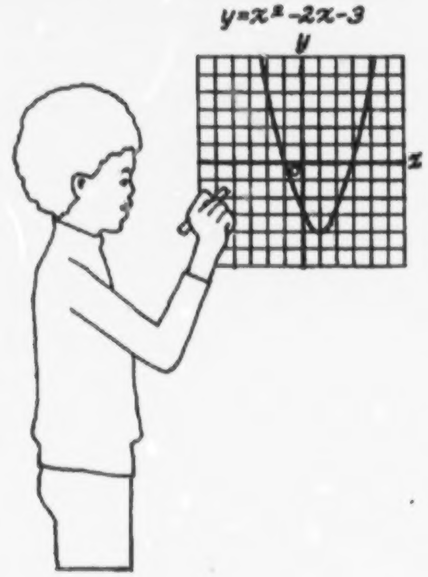
The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. The percentages may not total 100 percent because the "Moderate emphasis" category is not included. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

SUMMARY

Although many types of mathematics learning can take place outside of the school environment, there are some topic areas that students are unlikely to study unless they are covered in school. Thus, what students are taught in school becomes an important determinant of their achievement.

The information on curriculum coverage, mathematics homework, and instructional emphasis has revealed the following:

- About three-quarters of the eighth-grade students in Pennsylvania (74 percent) were in public schools where mathematics was identified as a special priority. This compares to 63 percent for the nation.
- In Pennsylvania, 88 percent of the students could take an algebra course in eighth grade for high-school course placement or credit.
- About the same percentage of students in Pennsylvania were taking eighth-grade mathematics (49 percent) as were taking a course in pre-algebra or algebra (48 percent). Across the nation, 62 percent were taking eighth-grade mathematics and 34 percent were taking a course in pre-algebra or algebra.
- According to their teachers, the greatest percentage of eighth-grade students in public schools in Pennsylvania spent either 15 or 30 minutes doing mathematics homework each day; according to the students, most of them spent 15 minutes doing mathematics homework each day. Across the nation, teachers reported that the largest percentage of students spent either 15 or 30 minutes doing mathematics homework each day, while students reported either 15 or 30 minutes daily.
- In Pennsylvania, relatively few of the students (5 percent) reported that they spent no time each day on mathematics homework, compared to 9 percent for the nation. Moreover, 8 percent of the students in Pennsylvania and 12 percent of students in the nation spent an hour or more each day on mathematics homework.
- Students whose teachers placed heavy instructional emphasis on Algebra and Functions had higher proficiency in this content area than students whose teachers placed little or no emphasis on Algebra and Functions. Students whose teachers placed heavy instructional emphasis on Numbers and Operations and Measurement had lower proficiency in these content areas than students whose teachers placed little or no emphasis on the same areas.



CHAPTER 4

How Is Mathematics Instruction Delivered?

Teachers facilitate learning through a variety of instructional practices. Because a particular teaching method may not be equally effective with all types of students, selecting and tailoring methods for students with different styles of learning or for those who come from different cultural backgrounds is an important aspect of teaching.[6]

An inspection of the availability and use of resources for mathematics education can provide insight into how and what students are learning in mathematics. To provide information about how instruction is delivered, students and teachers participating in the Trial State Assessment were asked to report on the use of various teaching and learning activities in their mathematics classrooms.

AVAILABILITY OF RESOURCES

Teachers' use of resources is obviously constrained by the availability of those resources. Thus, the assessed students' teachers were asked to what extent they were able to obtain all of the instructional materials and other resources they needed.

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[6] National Council of Teachers of Mathematics, *Professional Standards for the Teaching of Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1991).

From Table 9 and Table A9 in the Data Appendix:

- In Pennsylvania, 19 percent of the eighth-grade students had mathematics teachers who reported getting **all** of the resources they needed, while 29 percent of the students were taught by teachers who got only **some or none** of the resources they needed. Across the nation, these figures were 13 percent and 31 percent, respectively.
- In Pennsylvania, 36 percent of students attending schools in advantaged urban areas, 9 percent in schools in disadvantaged urban areas, 17 percent in schools in extreme rural areas, and 20 percent in schools in areas classified as "other" had mathematics teachers who got all the resources they needed.
- By comparison, in Pennsylvania, 22 percent of students attending schools in advantaged urban areas, 60 percent in schools in disadvantaged urban areas, 21 percent in schools in extreme rural areas, and 24 percent in schools in areas classified as "other" were in classrooms where only some or no resources were available.
- Students whose teachers got all the resources they needed had higher mathematics achievement levels than those whose teachers got only some or none of the resources they needed.

TABLE 9

Teachers' Reports on the Availability of Resources

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Pennsylvania	Northeast	Nation
Which of the following statements is true about how well supplied you are by your school system with the instructional materials and other resources you need to teach your class?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
I get all the resources I need.	19 (3.6) 274 (3.6)	26 (6.6) 271 (7.2)!	13 (2.4) 265 (4.2)
I get most of the resources I need.	52 (3.6) 267 (1.8)	38 (11.7) 272 (2.9)!	56 (4.0) 265 (2.0)
I get some or none of the resources I need.	29 (3.3) 259 (3.7)	36 (11.8) 274 (9.8)!	31 (4.2) 261 (2.9)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency.

PATTERNS IN CLASSROOM INSTRUCTION

Research in education and cognitive psychology has yielded many insights into the types of instructional activities that facilitate students' mathematics learning. Increasing the use of "hands-on" examples with concrete materials and placing problems in real-world contexts to help children construct useful meanings for mathematical concepts are among the recommended approaches.[7] Students' responses to a series of questions on their mathematics instruction provide an indication of the extent to which teachers are making use of the types of student-centered activities suggested by researchers. Table 10 presents data on patterns of classroom practice and Table 11 provides information on materials used for classroom instruction by the mathematics teachers of the assessed students.

According to their teachers:

- Less than half of the students in Pennsylvania (33 percent) worked mathematics problems in small groups at least once a week; about one-quarter never worked mathematics problems in small groups (21 percent).
- The largest percentage of the students (67 percent) used objects like rulers, counting blocks, or geometric shapes less than once a week; about one-quarter never used such objects (22 percent).
- In Pennsylvania, 74 percent of the students were assigned problems from a mathematics textbook almost every day; 5 percent worked textbook problems about once a week or less.
- About half of the students (51 percent) did problems from worksheets at least several times a week; about one-quarter did worksheet problems less than weekly (25 percent).

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[7] Thomas Romberg, "A Common Curriculum for Mathematics," *Individual Differences and the Common Curriculum: Eighty-second Yearbook of the National Society for the Study of Education* (Chicago, IL: University of Chicago Press, 1983).

TABLE 10 | Teachers' Reports on Patterns of Mathematics Instruction

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
About how often do students work problems in small groups?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
At least once a week	33 (3.3) 265 (2.9)	44 (6.4) 264 (6.0)!	50 (4.4) 260 (2.2)
Less than once a week	46 (3.2) 268 (2.2)	39 (8.6) 267 (5.0)!	43 (4.1) 264 (2.3)
Never	21 (3.2) 269 (4.2)	17 (6.5) *** (***)	8 (2.0) 277 (5.4)!
About how often do students use objects like rulers, counting blocks, or geometric solids?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
At least once a week	11 (1.7) 258 (4.0)	14 (5.5) *** (***)	22 (3.7) 254 (3.2)
Less than once a week	67 (3.1) 266 (1.9)	78 (6.8) 269 (1.6)	69 (3.9) 263 (1.9)
Never	22 (3.1) 276 (5.7)	9 (3.5) *** (***)	9 (2.6) 282 (5.9)!

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE 11

Teachers' Reports on Materials for Mathematics Instruction

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Pennsylvania	Northeast	Nation
About how often do students do problems from textbooks?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
Almost every day	74 (2.9) 272 (1.6)	57 (9.3) 276 (4.4)	62 (3.4) 267 (1.8)
Several times a week	21 (2.8) 255 (3.0)	31 (8.3) 261 (8.2)!	31 (3.1) 254 (2.9)
About once a week or less	5 (1.3) 247 (11.6)!	13 (2.8) *** (***)	7 (1.8) 260 (5.1)!
About how often do students do problems on worksheets?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
At least several times a week	51 (4.0) 262 (2.2)	53 (11.3) 262 (4.5)!	34 (3.8) 256 (2.3)
About once a week	24 (2.6) 272 (3.0)	32 (8.2) 270 (3.4)!	33 (3.4) 260 (2.3)
Less than weekly	25 (3.3) 272 (3.5)	15 (4.6) *** (***)	32 (3.6) 274 (2.7)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

The next section presents the students' responses to a corresponding set of questions, as well as the relationship of their responses to their mathematics proficiency. It also compares the responses of the students to those of their teachers.

COLLABORATING IN SMALL GROUPS

In Pennsylvania, 58 percent of the students reported never working mathematics problems in small groups (see Table 12); 17 percent of the students worked mathematics problems in small groups at least once a week.

TABLE 12 | Students' Reports on the Frequency of Small Group Work

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Pennsylvania	Northeast	Nation
How often do you work in small groups in your mathematics class?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
At least once a week	17 (1.4) 263 (2.6)	27 (6.7) 260 (4.8)!	28 (2.5) 258 (2.7)
Less than once a week	25 (1.5) 272 (1.9)	22 (2.8) 271 (5.0)	28 (1.4) 267 (2.0)
Never	58 (2.2) 266 (1.9)	51 (7.9) 273 (4.6)	44 (2.9) 261 (1.6)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency.

Examining the subpopulations (Table A12 in the Data Appendix):

- In Pennsylvania, 23 percent of students attending schools in advantaged urban areas, 20 percent in schools in disadvantaged urban areas, 25 percent in schools in extreme rural areas, and 14 percent in schools in areas classified as "other" worked in small groups at least once a week.
- Further, 16 percent of White students, 16 percent of Black students, and 31 percent of Hispanic students worked mathematics problems in small groups at least once a week.
- Females were as likely as males to work mathematics problems in small groups at least once a week (16 percent and 18 percent, respectively).

USING MATHEMATICAL OBJECTS

Students were asked to report on the frequency with which they used mathematical objects such as rulers, counting blocks, or geometric solids. Table 13 below and Table A13 in the Data Appendix summarize these data:

- About half of the students in Pennsylvania (54 percent) never used mathematical objects; 17 percent used these objects at least once a week.
- Mathematical objects were used at least once a week by 22 percent of students attending schools in advantaged urban areas, 16 percent in schools in disadvantaged urban areas, 13 percent in schools in extreme rural areas, and 18 percent in schools in areas classified as "other".
- Males were more likely than females to use mathematical objects in their mathematics classes at least once a week (20 percent and 15 percent, respectively).
- In addition, 17 percent of White students, 15 percent of Black students, and 22 percent of Hispanic students used mathematical objects at least once a week.

TABLE 13 | Students' Reports on the Use of Mathematics Objects

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
How often do you work with objects like rulers, counting blocks, or geometric solids in your mathematics class?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
At least once a week	17 (1.5) 264 (2.4)	30 (4.3) 265 (6.9)	28 (1.8) 258 (2.6)
Less than once a week	29 (1.2) 268 (1.6)	30 (3.2) 277 (3.9)	31 (1.2) 269 (1.5)
Never	54 (1.9) 266 (2.1)	40 (4.8) 266 (3.9)	41 (2.2) 259 (1.6)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample.

MATERIALS FOR MATHEMATICS INSTRUCTION

The percentages of eighth-grade public-school students in Pennsylvania who frequently worked mathematics problems from textbooks (Table 14) or worksheets (Table 15) indicate that these materials play a major role in mathematics teaching and learning. Regarding the frequency of textbook usage (Table 14 and Table A14 in the Data Appendix):

- About three-quarters of the students in Pennsylvania (75 percent) worked mathematics problems from textbooks almost every day, compared to 74 percent of the students in the nation.
- Textbooks were used almost every day by 71 percent of students attending schools in advantaged urban areas, 69 percent in schools in disadvantaged urban areas, 85 percent in schools in extreme rural areas, and 77 percent in schools in areas classified as "other".

TABLE 14 | Students' Reports on the Frequency of Mathematics Textbook Use

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Pennsylvania	Northeast	Nation
How often do you do mathematics problems from textbooks in your mathematics class?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
Almost every day	75 (1.7) 270 (1.5)	72 (5.3) 275 (3.7)	74 (1.9) 267 (1.2)
Several times a week	17 (1.0) 256 (2.3)	14 (1.6) 261 (4.5)	14 (0.8) 252 (1.7)
About once a week or less	9 (0.9) 256 (4.6)	14 (4.3) 249 (7.4)!	12 (1.8) 242 (4.5)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency.

And, for the frequency of worksheet usage (Table 15 and Table A15 in the Data Appendix):

- Less than half of the students in Pennsylvania (42 percent) used worksheets at least several times a week, compared to 38 percent in the nation.
- Worksheets were used at least several times a week by 52 percent of students attending schools in advantaged urban areas, 45 percent in schools in disadvantaged urban areas, 35 percent in schools in extreme rural areas, and 41 percent in schools in areas classified as "other".

TABLE 15 | Students' Reports on the Frequency of Mathematics Worksheet Use

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Pennsylvania	Northeast	Nation
How often do you do mathematics problems on worksheets in your mathematics class?	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
At least several times a week	42 (2.4) 261 (1.8)	44 (5.9) 261 (3.8)	38 (2.4) 253 (2.2)
About once a week	22 (1.4) 268 (2.4)	22 (1.8) 268 (3.6)	25 (1.2) 261 (1.4)
Less than weekly	35 (2.4) 271 (2.4)	34 (6.5) 282 (4.3)!	37 (2.5) 272 (1.9)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency.

Table 16 compares students' and teachers' responses to questions about the patterns of classroom instruction and materials for mathematics instruction.

TABLE 16 | Comparison of Students' and Teachers' Reports on Patterns of and Materials for Mathematics Instruction

PERCENTAGE OF STUDENTS

1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**		**Northeast**		**Nation**	
Patterns of classroom instruction	**Percentage**		**Percentage**		**Percentage**	
	Students	**Teachers**	**Students**	**Teachers**	**Students**	**Teachers**
Percentage of students who work mathematics problems in small groups						
At least once a week	17 (1.4)	33 (3.3)	27 (6.7)	44 (6.4)	28 (2.5)	50 (4.4)
Less than once a week	25 (1.5)	46 (3.2)	22 (2.8)	39 (8.6)	28 (1.4)	43 (4.1)
Never	58 (2.2)	21 (3.2)	51 (7.9)	17 (6.5)	44 (2.9)	8 (2.0)
Percentage of students who use objects like rulers, counting blocks, or geometric solids						
At least once a week	17 (1.5)	11 (1.7)	30 (4.3)	14 (5.5)	28 (1.8)	22 (3.7)
Less than once a week	29 (1.2)	67 (3.1)	30 (3.2)	78 (6.8)	31 (1.2)	69 (3.9)
Never	54 (1.9)	22 (3.1)	40 (4.8)	9 (3.5)	41 (2.2)	9 (2.6)
Materials for mathematics instruction	**Percentage**		**Percentage**		**Percentage**	
	Students	**Teachers**	**Students**	**Teachers**	**Students**	**Teachers**
Percentage of students who use a mathematics textbook						
Almost every day	75 (1.7)	74 (2.9)	72 (5.3)	57 (9.3)	74 (1.9)	62 (3.4)
Several times a week	17 (1.0)	21 (2.8)	14 (1.6)	31 (8.3)	14 (0.8)	31 (3.1)
About once a week or less	9 (0.9)	5 (1.3)	14 (4.3)	13 (2.8)	12 (1.8)	7 (1.8)
Percentage of students who use a mathematics worksheet						
At least several times a week	42 (2.4)	51 (4.0)	44 (5.9)	53 (11.3)	38 (2.4)	34 (3.8)
About once a week	22 (1.4)	24 (2.6)	22 (1.8)	32 (8.2)	25 (1.2)	33 (3.4)
Less than weekly	35 (2.4)	25 (3.3)	34 (6.5)	15 (4.6)	37 (2.5)	32 (3.6)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample.

SUMMARY

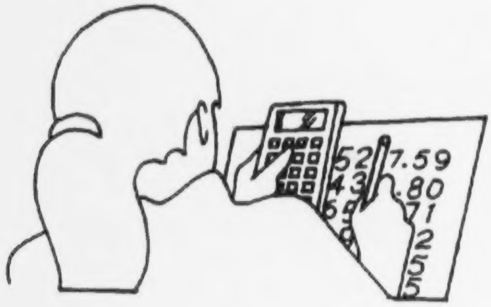
Because classroom instructional time is typically limited, teachers need to make the best possible use of what is known about effective instructional delivery practices and resources. It appears that mathematics textbooks and worksheets continue to play a major role in mathematics teaching. Although there is some evidence that other instructional resources and practices are emerging, they are not yet commonplace.

According to the students' **mathematics teachers**:

- Less than half of the students in Pennsylvania (33 percent) worked mathematics problems in small groups at least once a week; about one-quarter never worked in small groups (21 percent).
- The largest percentage of the students (67 percent) used objects like rulers, counting blocks, or geometric shapes less than once a week, and about one-quarter never used such objects (22 percent).
- In Pennsylvania, 74 percent of the students were assigned problems from a mathematics textbook almost every day; 5 percent worked textbook problems about once a week or less.
- About half of the students (51 percent) did problems from worksheets at least several times a week; about one-quarter did worksheet problems less than weekly (25 percent).

And, according to the **students**:

- In Pennsylvania, 58 percent of the students never worked mathematics problems in small groups; 17 percent of the students worked mathematics problems in small groups at least once a week.
- About half of the students in Pennsylvania (54 percent) never used mathematical objects; 17 percent used these objects at least once a week.
- About three-quarters of the students in Pennsylvania (75 percent) worked mathematics problems from textbooks almost every day, compared to 74 percent of students in the nation.
- Less than half of the students in Pennsylvania (42 percent) used worksheets at least several times a week, compared to 38 percent in the nation.



CHAPTER 5

How Are Calculators Used?

Although computation skills are vital, calculators -- and, to a lesser extent, computers -- have drastically changed the methods that can be used to perform calculations. Calculators are important tools for mathematics and students need to be able to use them wisely. The National Council of Teachers of Mathematics and many other educators believe that mathematics teachers should help students become proficient in the use of calculators to free them from time-consuming computations and to permit them to focus on more challenging tasks.[8] The increasing availability of affordable calculators should make it more likely and attractive for students and schools to acquire and use these devices.

Given the prevalence and potential importance of calculators, part of the Trial State Assessment focused on attitudes toward and uses of calculators. Teachers were asked to report the extent to which they encouraged or permitted calculator use for various activities in mathematics class and students were asked about the availability and use of calculators.

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[8] National Assessment of Educational Progress, *Mathematics Objectives 1990 Assessment* (Princeton, NJ: Educational Testing Service, 1988).

National Council of Teachers of Mathematics, *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

Table 17 provides a profile of Pennsylvania eighth-grade public schools' policies with regard to calculator use:

- In comparison to 33 percent across the nation, 20 percent of the students in Pennsylvania had teachers who allowed calculators to be used for tests.
- About the same percentage of students in Pennsylvania and in the nation had teachers who permitted unrestricted use of calculators (13 percent and 18 percent, respectively).

TABLE 17 | Teachers' Reports of Pennsylvania Policies on Calculator Use

PERCENTAGE OF STUDENTS

1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
	Percentage	**Percentage**	**Percentage**
Percentage of eighth-grade students in public schools whose teachers permit the **unrestricted use of calculators**	13 (2.7)	20 (11.8)	18 (3.4)
Percentage of eighth-grade students in public schools whose teachers permit the **use of calculators for tests**	20 (3.2)	14 (9.2)	33 (4.5)
Percentage of eighth-grade students in public schools whose teachers report that students have **access to calculators owned by the school**	54 (4.0)	28 (8.2)	56 (4.6)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample.

THE AVAILABILITY OF CALCULATORS

In Pennsylvania, most students or their families (97 percent) owned calculators (Table 18); however, fewer students (38 percent) had teachers who explained the use of calculators to them. From Table A18 in the Data Appendix:

- In Pennsylvania, 36 percent of White students, 43 percent of Black students, and 48 percent of Hispanic students had teachers who explained how to use them.
- Females were as likely as males to have the use of calculators explained to them (37 percent and 39 percent, respectively).

TABLE 18 | Students' Reports on Whether They Own a Calculator and Whether Their Teacher Explains How To Use One

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
Do you or your family own a calculator?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
Yes	97 (0.4) 267 (1.6)	98 (0.7) 269 (3.3)	97 (0.4) 263 (1.3)
No	3 (0.4) 234 (4.2)	2 (0.7) *** (***)	3 (0.4) 234 (3.8)
Does your mathematics teacher explain how to use a calculator for mathematics problems?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
Yes	38 (1.9) 260 (1.8)	30 (4.0) 258 (4.3)	49 (2.3) 258 (1.7)
No	62 (1.9) 271 (1.7)	70 (4.0) 274 (3.8)	51 (2.3) 266 (1.5)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

THE USE OF CALCULATORS

As previously noted, calculators can free students from tedious computations and allow them to concentrate instead on problem solving and other important skills and content. As part of the Trial State Assessment, students were asked how frequently (never, sometimes, almost always) they used calculators for working problems in class, doing problems at home, and taking quizzes or tests. As reported in Table 19:

- In Pennsylvania, 36 percent of the students never used a calculator to work problems in class, while 41 percent almost always did.
- Some of the students (20 percent) never used a calculator to work problems at home, compared to 28 percent who almost always used one.
- Less than half of the students (43 percent) never used a calculator to take quizzes or tests, while 18 percent almost always did.

TABLE 19 | Students' Reports on the Use of a Calculator for Problem Solving or Tests

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Pennsylvania	Northeast	Nation
How often do you use a calculator for the following tasks?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
Working problems in class			
Almost always	41 (1.4) 254 (1.8)	40 (4.0) 255 (3.9)	48 (1.5) 254 (1.5)
Never	36 (1.6) 279 (1.6)	39 (6.0) 282 (2.2)	23 (1.9) 272 (1.4)
Doing problems at home			
Almost always	28 (1.1) 260 (1.6)	30 (3.3) 264 (5.8)	30 (1.3) 261 (1.8)
Never	20 (1.0) 277 (2.1)	22 (2.5) 275 (2.3)	19 (0.9) 263 (1.8)
Taking quizzes or tests			
Almost always	18 (1.0) 250 (2.5)	23 (3.3) 256 (5.6)	27 (1.4) 253 (2.4)
Never	43 (1.6) 279 (1.6)	45 (5.1) 284 (2.1)	30 (2.0) 274 (1.3)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. The percentages may not total 100 percent because the "Sometimes" category is not included.

WHEN TO USE A CALCULATOR

Part of the Trial State Assessment was designed to investigate whether students know when the use of a calculator is helpful and when it is not. There were seven sections of mathematics questions in the assessment; however, each student took only three of those sections. For two of the seven sections, students were given calculators to use. The test administrator provided the students with instructions and practice on how to use a calculator prior to the assessment. During the assessment, students were allowed to choose whether or not to use a calculator for each item in the calculator sections, and they were asked to indicate in their test booklets whether they did or did not use a calculator for each item.

Certain items in the calculator sections were defined as "calculator-active" items -- that is, items that required the student to use the calculator to determine the correct response. Certain other items were defined as "calculator-inactive" items -- items whose solution neither required nor suggested the use of a calculator. The remainder of the items were "calculator-neutral" items, for which the solution to the question did not require the use of a calculator.

In total, there were eight calculator-active items, 13 calculator-neutral items, and 17 calculator-inactive items across the two sections. However, because of the sampling methodology used as part of the Trial State Assessment, not every student took both sections. Some took both sections, some took only one section, and some took neither.

To examine the characteristics of students who generally knew when the use of the calculator was helpful and those who did not, the students who responded to one or both of the calculator sections were categorized into two groups:

- **High** -- students who used the calculator appropriately (i.e., used it for the calculator-active items and did not use it for the calculator-inactive items) at least 85 percent of the time and indicated that they had used the calculator for at least half of the calculator-active items they were presented.
- **Other** -- students who did not use the calculator appropriately at least 85 percent of the time or indicated that they had used the calculator for less than half of the calculator-active items they were presented.

The data presented in Table 20 and Table A20 in the Data Appendix are highlighted below:

- A smaller percentage of students in Pennsylvania were in the High group than were in the Other group.
- About the same percentage of males and females were in the High group.
- In addition, 48 percent of White students, 39 percent of Black students, and 42 percent of Hispanic students were in the High group.

TABLE 20 | Students' Knowledge of Using Calculators

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
"Calculator-use" group	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
High	47 (1.2) 274 (1.9)	44 (2.5) 279 (3.8)	42 (1.3) 272 (1.6)
Other	53 (1.2) 260 (1.7)	56 (2.5) 263 (2.9)	58 (1.3) 255 (1.5)

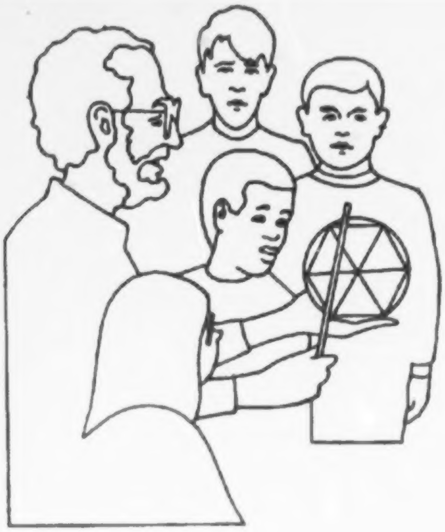
The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample.

SUMMARY

Given the prevalence of inexpensive calculators, it may no longer be necessary or useful to devote large portions of instructional time to teaching students how to perform routine calculations by hand. Using calculators to replace this time-consuming process would create more instructional time for other mathematical skill topics, such as problem solving, to be emphasized.

The data related to calculators and their use show that:

- In comparison to 33 percent across the nation, 20 percent of the students in Pennsylvania had teachers who allowed calculators to be used for tests.
- About the same percentage of students in Pennsylvania and in the nation had teachers who permitted unrestricted use of calculators (13 percent and 18 percent, respectively).
- In Pennsylvania, most students or their families (97 percent) owned calculators; however, fewer students (38 percent) had teachers who explained the use of calculators to them.
- In Pennsylvania, 36 percent of the students never used a calculator to work problems in class, while 41 percent almost always did.
- Some of the students (20 percent) never used a calculator to work problems at home, compared to 28 percent who almost always used one.
- Less than half of the students (43 percent) never used a calculator to take quizzes or tests, while 18 percent almost always did.



CHAPTER 6

Who Is Teaching Eighth-Grade Mathematics?

In recent years, accountability for educational outcomes has become an issue of increasing importance to federal, state, and local governments. As part of their effort to improve the educational process, policymakers have reexamined existing methods of educating and certifying teachers.[9] Many states have begun to raise teacher certification standards and strengthen teacher training programs. As shown in Table 21:

- In Pennsylvania, 47 percent of the students were being taught by mathematics teachers who reported having **at least** a master's or education specialist's degree. This compares to 44 percent for students across the nation.
- Many of the students (80 percent) had mathematics teachers who had the highest level of teaching certification available. This is different from the figure for the nation, where 66 percent of the students were taught by mathematics teachers who were certified at the highest level available in their states.
- Many of the students (89 percent) had mathematics teachers who had a mathematics (middle school or secondary) teaching certificate. This compares to 84 percent for the nation.

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[9] National Council of Teachers of Mathematics, *Professional Standards for the Teaching of Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1991).

TABLE 21 | Profile of Eighth-Grade Public-School Mathematics Teachers

1990 NAEP TRIAL STATE ASSESSMENT	PERCENTAGE OF STUDENTS Pennsylvania	 Northeast	 Nation
	Percentage	**Percentage**	**Percentage**
Percentage of students whose mathematics teachers reported having the following degrees			
Bachelor's degree	53 (3.6)	46 (15.0)	56 (4.2)
Master's or specialist's degree	45 (3.5)	54 (15.0)	42 (4.2)
Doctorate or professional degree	1 (0.7)	0 (0.0)	2 (1.4)
Percentage of students whose mathematics teachers have the following types of teaching certificates that are recognized by Pennsylvania			
No regular certification	7 (2.2)	0 (0.0)	4 (1.2)
Regular certification but less than the highest available	14 (2.7)	19 (11.5)	29 (4.3)
Highest certification available (permanent or long-term)	80 (3.2)	81 (11.5)	66 (4.3)
Percentage of students whose mathematics teachers have the following types of teaching certificates that are recognized by Pennsylvania			
Mathematics (middle school or secondary)	89 (2.6)	89 (3.7)	84 (2.2)
Education (elementary or middle school)	9 (2.7)	8 (3.8)	12 (2.6)
Other	2 (0.8)	4 (3.7)	4 (1.5)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample.

EDUCATIONAL BACKGROUND

Although mathematics teachers are held responsible for providing high-quality instruction to their students, there is a concern that many teachers have had limited exposure to content and concepts in the subject area. Accordingly, the Trial State Assessment gathered details on the teachers' educational backgrounds -- more specifically, their undergraduate and graduate majors and their in-service training.

Teachers' responses to questions concerning their undergraduate and graduate fields of study (Table 22) show that:

- In Pennsylvania, 69 percent of the eighth-grade public-school students were being taught mathematics by teachers who had an undergraduate major in mathematics. In comparison, 43 percent of the students across the nation had mathematics teachers with the same major.
- Less than half of the eighth-grade public-school students in Pennsylvania (33 percent) were taught mathematics by teachers who had a graduate major in mathematics. Across the nation, 22 percent of the students were taught by teachers who majored in mathematics in graduate school.

TABLE 22

Teachers' Reports on Their Undergraduate and Graduate Fields of Study

	PERCENTAGE OF STUDENTS		
1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
What was your undergraduate major?	**Percentage**	**Percentage**	**Percentage**
Mathematics	69 (3.5)	44 (9.2)	43 (3.9)
Education	24 (2.9)	34 (8.0)	35 (3.8)
Other	8 (2.2)	22 (6.1)	22 (3.3)
What was your graduate major?	**Percentage**	**Percentage**	**Percentage**
Mathematics	33 (3.1)	22 (9.7)	22 (3.4)
Education	44 (4.0)	42 (8.2)	38 (3.5)
Other or no graduate level study	23 (2.8)	37 (4.5)	40 (3.4)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample.

Teachers' responses to questions concerning their in-service training for the year up to the Trial State Assessment (Table 23) show that:

- In Pennsylvania, 27 percent of the eighth-grade public-school students had teachers who spent at least 16 hours on in-service education dedicated to mathematics or the teaching of mathematics. Across the nation, 39 percent of the students had teachers who spent at least that much time on similar types of in-service training.
- Some of the students in Pennsylvania (19 percent) had mathematics teachers who spent no time on in-service education devoted to mathematics or the teaching of mathematics. Nationally, 11 percent of the students had mathematics teachers who spent no time on similar in-service training.

TABLE 23 | Teachers' Reports on Their In-Service Training

	PERCENTAGE OF STUDENTS		
1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
During the last year, how much time in total have you spent on in-service education in mathematics or the teaching of mathematics?	**Percentage**	**Percentage**	**Percentage**
None	19 (3.3)	25 (7.0)	11 (2.1)
One to 15 hours	54 (3.9)	37 (4.1)	51 (4.1)
16 hours or more	27 (3.4)	38 (8.4)	39 (3.8)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample.

SUMMARY

Recent results from international studies have shown that students from the United States do not compare favorably with students from other nations in mathematics and science achievement.[10] Further, results from NAEP assessments have indicated that students' achievement in mathematics and science is much lower than educators and the public would like it to be.[11] In curriculum areas requiring special attention and improvement, such as mathematics, it is particularly important to have well-qualified teachers. When performance differences across states and territories are described, variations in teacher qualifications and practices may point to areas worth further exploration. There is no guarantee that individuals with a specific set of credentials will be effective teachers; however, it is likely that relevant training and experience do contribute to better teaching.

The information about teachers' educational backgrounds and experience reveals that:

- In Pennsylvania, 47 percent of the assessed students were being taught by mathematics teachers who reported having at least a master's or education specialist's degree. This compares to 44 percent for students across the nation.
- Many of the students (80 percent) had mathematics teachers who had the highest level of teaching certification available. This is different from the figure for the nation, where 66 percent of students were taught by mathematics teachers who were certified at the highest level available in their states.
- In Pennsylvania, 69 percent of the eighth-grade public-school students were being taught mathematics by teachers who had an undergraduate major in mathematics. In comparison, 43 percent of the students across the nation had mathematics teachers with the same major.
- Less than half of the eighth-grade public-school students in Pennsylvania (33 percent) were taught mathematics by teachers who had a graduate major in mathematics. Across the nation, 22 percent of the students were taught by teachers who majored in mathematics in graduate school.

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[10] Archie E. Lapointe, Nancy A. Mead, and Gary W. Phillips, *A World of Differences: An International Assessment of Mathematics and Science* (Princeton, NJ: Center for the Assessment of Educational Progress, Educational Testing Service, 1988).

[11] Ina V.S. Mullis, John A. Dossey, Eugene H. Owen, and Gary W. Phillips, *The State of Mathematics Achievement: NAEP's 1990 Assessment of the Nation and the Trial Assessment of the States* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1991).

- In Pennsylvania, 27 percent of the eighth-grade public-school students had teachers who spent at least 16 hours on in-service education dedicated to mathematics or the teaching of mathematics. Across the nation, 39 percent of the students had teachers who spent at least that much time on similar types of in-service training.

- Some of the students in Pennsylvania (19 percent) had mathematics teachers who spent no time on in-service education devoted to mathematics or the teaching of mathematics. Nationally, 11 percent of the students had mathematics teachers who spent no time on similar in-service training.

CHAPTER 7

The Conditions Beyond School that Facilitate Mathematics Learning and Teaching

Because students spend much more time out of school each day than they do in school, it is reasonable to expect that out-of-school factors greatly influence students' attitudes and behaviors in school. Parents and guardians can therefore play an important role in the education of their children. Family expectations, encouragement, and participation in student learning experiences are powerful influences. Together, teachers and parents can help build students' motivation to learn and can broaden their interest in mathematics and other subjects.

To examine the relationship between home environment and mathematics proficiency, students participating in the Trial State Assessment were asked a series of questions about themselves, their parents or guardians, and home factors related to education.

AMOUNT OF READING MATERIALS IN THE HOME

The number and types of reading and reference materials in the home may be an indicator of the value placed by parents on learning and schooling. Students participating in the Trial State Assessment were asked about the availability of newspapers, magazines, books, and an encyclopedia at home. Average mathematics proficiency associated with having zero to two, three, or four of these types of materials in the home is shown in Table 24 and Table A24 in the Data Appendix.

TABLE 24

Students' Reports on Types of Reading Materials in the Home

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Pennsylvania	Northeast	Nation
Does your family have, or receive on a regular basis, any of the following items: more than 25 books, an encyclopedia, newspapers, magazines?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
Zero to two types	14 (0.7) 249 (2.5)	13 (2.0) 252 (3.9)	21 (1.0) 244 (2.0)
Three types	30 (1.2) 262 (1.8)	31 (2.7) 264 (2.9)	30 (1.0) 258 (1.7)
Four types	56 (1.4) 273 (1.6)	56 (3.7) 276 (4.3)	48 (1.3) 272 (1.5)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample.

The data for Pennsylvania reveal that:

- Students in Pennsylvania who had all four of these types of materials in the home showed higher mathematics proficiency than did students with zero to two types of materials. This is similar to the results for the nation, where students who had all four types of materials showed higher mathematics proficiency than did students who had zero to two types.

- A smaller percentage of Black and Hispanic students had all four types of these reading materials in their homes than did White students.
- A greater percentage of students attending schools in advantaged urban areas than in disadvantaged urban areas, extreme rural areas, or areas classified as "other" had all four types of these reading materials in their homes.

HOURS OF TELEVISION WATCHED PER DAY

Excessive television watching is generally seen as detracting from time spent on educational pursuits. Students participating in the Trial State Assessment were asked to report on the amount of television they watched each day (Table 25).

TABLE 25 | Students' Reports on the Amount of Time Spent Watching Television Each Day

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Pennsylvania**	**Northeast**	**Nation**
How much television do you usually watch each day?	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
One hour or less	14 (0.7) 276 (2.4)	12 (1.3) 277 (4.4)	12 (0.8) 269 (2.2)
Two hours	24 (1.1) 272 (1.8)	21 (2.3) 278 (3.1)	21 (0.9) 268 (1.8)
Three hours	26 (1.1) 269 (1.6)	23 (1.2) 271 (3.5)	22 (0.8) 265 (1.7)
Four to five hours	25 (1.0) 262 (1.6)	28 (2.6) 266 (4.1)	28 (1.1) 260 (1.7)
Six hours or more	10 (0.8) 244 (2.7)	15 (3.3) 254 (5.5)!	16 (1.0) 245 (1.7)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency.

From Table 25 and Table A25 in the Data Appendix:

- In Pennsylvania, average mathematics proficiency was lowest for students who spent six hours or more watching television each day.
- Some of the eighth-grade public-school students in Pennsylvania (14 percent) watched one hour or less of television each day; 10 percent watched six hours or more.
- About the same percentage of males and females tended to watch six or more hours of television daily. Similarly, about the same percentage of males and females watched one hour or less per day.
- In addition, 7 percent of White students, 29 percent of Black students, and 21 percent of Hispanic students watched six hours or more of television each day. In comparison, 14 percent of White students, 8 percent of Black students, and 8 percent of Hispanic students tended to watch only an hour or less.

STUDENT ABSENTEEISM

Excessive absenteeism may also be an obstacle to students' success in school. To examine the relationship of student absenteeism to mathematics proficiency, the students participating in the Trial State Assessment were asked to report on the number of days of school they missed during the one-month period preceding the assessment.

From Table 26 and Table A26 in the Data Appendix:

- In Pennsylvania, average mathematics proficiency was lowest for students who missed three or more days of school.
- Less than half of the students in Pennsylvania (41 percent) did not miss any school days in the month prior to the assessment, while 24 percent missed three days or more.
- In addition, 22 percent of White students, 32 percent of Black students, and 45 percent of Hispanic students missed three or more days of school.

- Similarly, 20 percent of students attending schools in advantaged urban areas, 35 percent in schools in disadvantaged urban areas, 27 percent in schools in extreme rural areas, and 21 percent in schools in areas classified as "other" missed three or more days of school.

TABLE 26 | Students' Reports on the Number of Days of School Missed

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Pennsylvania	Northeast	Nation
How many days of school did you miss last month?	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
None	41 (1.1) 271 (1.5)	43 (2.2) 275 (3.6)	45 (1.1) 265 (1.8)
One or two days	35 (1.1) 269 (1.8)	37 (3.1) 271 (2.8)	32 (0.9) 266 (1.5)
Three days or more	24 (1.0) 254 (2.1)	21 (3.0) 255 (5.5)	23 (1.1) 250 (1.0)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample.

STUDENTS' PERCEPTIONS OF MATHEMATICS

According to the National Council of Teachers of Mathematics, learning mathematics should require students not only to master essential skills and concepts but also to develop confidence in their mathematical abilities and to value mathematics as a discipline.[12] Students were asked if they agreed or disagreed with five statements designed to elicit their perceptions of mathematics. These included statements about:

- Personal **experience** with mathematics, including students' enjoyment of mathematics and level of confidence in their mathematics abilities: *I like mathematics; I am good in mathematics.*
- **Value** of mathematics, including students' perceptions of its present utility and its expected relevance to future work and life requirements: *Almost all people use mathematics in their jobs; mathematics is not more for boys than for girls.*
- The **nature** of mathematics, including students' ability to identify the salient features of the discipline: *Mathematics is useful for solving everyday problems.*

A student "perception index" was developed to examine students' perceptions of and attitudes toward mathematics. For each of the five statements, students who responded "strongly agree" were given a value of 1 (indicating very positive attitudes about the subject), those who responded "agree" were given a value of 2, and those who responded "undecided," "disagree," or "strongly disagree" were given a value of 3. Each student's responses were averaged over the five statements. The students were then assigned a perception index according to whether they tended to strongly agree with the statements (an index of 1), tended to agree with the statements (an index of 2), or tended to be undecided, to disagree, or to strongly disagree with the statements (an index of 3).

Table 27 provides the data for the students' attitudes toward mathematics as defined by their perception index. The following results were observed for Pennsylvania:

- Average mathematics proficiency was highest for students who were in the "strongly agree" category and lowest for students who were in the "undecided, disagree, strongly disagree" category.
- About one-quarter of the students (27 percent) were in the "strongly agree" category (perception index of 1). This compares to 27 percent across the nation.
- About one-quarter of the students in Pennsylvania (23 percent), compared to 24 percent across the nation, were in the "undecided, disagree, or strongly disagree" category (perception index of 3).

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[12] National Council of Teachers of Mathematics, *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

TABLE 27 | Students' Perceptions of Mathematics

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Pennsylvania	Northeast	Nation
Student "perception index" groups	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
Strongly agree ("perception index" of 1)	27 (1.0) 275 (2.1)	26 (4.9) 276 (5.0)!	27 (1.3) 271 (1.9)
Agree ("perception index" of 2)	50 (0.9) 267 (1.6)	53 (3.0) 270 (4.5)	49 (1.0) 262 (1.7)
Undecided, disagree, strongly disagree ("perception index" of 3)	23 (1.0) 255 (1.9)	21 (3.0) 261 (5.8)	24 (1.2) 251 (1.8)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency.

SUMMARY

Some out-of-school factors cannot be changed, but others can be altered in a positive way to influence a student's learning and motivation. Partnerships among students, parents, teachers, and the larger community can affect the educational environment in the home, resulting in more out-of-school reading and an increased value placed on educational achievement, among other desirable outcomes.

The data related to out-of-school factors show that:

- Students in Pennsylvania who had four types of reading materials (an encyclopedia, newspapers, magazines, and more than 25 books) at home showed higher mathematics proficiency than did students with zero to two types of materials. This is similar to the results for the nation, where students who had all four types of materials showed higher mathematics proficiency than did students who had zero to two types.

- Some of the eighth-grade public-school students in Pennsylvania (14 percent) watched one hour or less of television each day; 10 percent watched six hours or more. Average mathematics proficiency was lowest for students who spent six hours or more watching television each day.

- Less than half of the students in Pennsylvania (41 percent) did not miss any school days in the month prior to the assessment, while 24 percent missed three days or more. Average mathematics proficiency was lowest for students who missed three or more days of school.

- About one-quarter of the students (27 percent) were in the "strongly agree" category relating to students' perceptions of mathematics. Average mathematics proficiency was highest for students who were in the "strongly agree" category and lowest for students who were in the "undecided, disagree, strongly disagree" category.

PROCEDURAL APPENDIX

This appendix provides an overview of the technical details of the 1990 Trial State Assessment Program. It includes a discussion of the assessment design, the mathematics framework and objectives upon which the assessment was based, and the procedures used to analyze the results.

The objectives for the assessment were developed through a consensus process managed by the Council of Chief State School Officers, and the items were developed through a similar process managed by Educational Testing Service. The development of the Trial State Assessment Program benefitted from the involvement of hundreds of representatives from State Education Agencies who attended numerous NETWORK meetings, served on committees, reviewed the framework, objectives, and questions, and, in general, provided important suggestions on all aspects of the program.

Assessment Design

The 1990 Trial State Assessment was based on a *focused balanced incomplete block (BIB) spiral matrix design* -- a design that enables broad coverage of mathematics content while minimizing the burden for any one student.

In total, 137 cognitive mathematics items were developed for the assessment, including 35 open-ended items. The first step in implementing the BIB design required dividing the entire set of mathematics items into seven units called *blocks*. Each block was designed to be completed in 15 minutes.

The blocks were then assembled into assessment booklets so that each booklet contained two background questionnaires -- the first consisting of general background questions and the second consisting of mathematics background questions -- and three blocks of cognitive mathematics items. Students were given five minutes to complete each of the background questionnaires and 45 minutes to complete the three 15-minute blocks of mathematics items. Thus, the entire assessment required approximately 55 minutes of student time.

In accordance with the BIB design, the blocks were assigned to the assessment booklets so that each block appeared in exactly three booklets and each block appeared with every other block in one booklet. Seven assessment booklets were used in the Trial State Assessment Program. The booklets were *spiraled* or interleaved in a systematic sequence so that each booklet appeared an appropriate number of times in the sample. The students within an assessment session were assigned booklets in the order in which the booklets were spiraled. Thus, students in any given session received a variety of different booklets and only a small number of students in the session received the same booklet.

Assessment Content

The framework and objectives for the Trial State Assessment Program were developed using a broad-based consensus process, as described in the introduction to this report.[1] The assessment framework consisted of two dimensions: mathematical content areas and abilities. The five content areas assessed were Numbers and Operations; Measurement; Geometry; Data Analysis, Statistics, and Probability; and Algebra and Functions (see Figure A1). The three mathematical ability areas assessed were Conceptual Understanding, Procedural Knowledge, and Problem Solving (see Figure A2).

Data Analysis and Scales

Once the assessments had been conducted and information from the assessment booklets had been compiled in a database, the assessment data were weighted to match known population proportions and adjusted for nonresponse. Analyses were then conducted to determine the percentages of students who gave various responses to each cognitive and background question.

Item response theory (IRT) was used to estimate average mathematics proficiency for each jurisdiction and for various subpopulations, based on students' performance on the set of mathematics items they received. IRT provides a common scale on which performance can be reported for the nation, each jurisdiction, and subpopulations, even when all students do not answer the same set of questions. This common scale makes it possible to report on relationships between students' characteristics (based on their responses to the background questions) and their overall performance in the assessment.

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[1] National Assessment of Educational Progress, *Mathematics Objectives: 1990 Assessment* (Princeton, NJ: Educational Testing Service, 1988).

FIGURE A1 | Content Areas Assessed

Numbers and Operations

This content area focuses on students' understanding of numbers (whole numbers, fractions, decimals, integers) and their application to real-world situations, as well as computational and estimation situations. Understanding numerical relationships as expressed in ratios, proportions, and percents is emphasized. Students' abilities in estimation, mental computation, use of calculators, generalization of numerical patterns, and verification of results are also included.

Measurement

This content area focuses on students' ability to describe real-world objects using numbers. Students are asked to identify attributes, select appropriate units, apply measurement concepts, and communicate measurement-related ideas to others. Questions are included that require an ability to read instruments using metric, customary, or nonstandard units, with emphasis on precision and accuracy. Questions requiring estimation, measurements, and applications of measurements of length, time, money, temperature, mass/weight, area, volume, capacity, and angles are also included in this content area.

Geometry

This content area focuses on students' knowledge of geometric figures and relationships and on their skills in working with this knowledge. These skills are important at all levels of schooling as well as in practical applications. Students need to be able to model and visualize geometric figures in one, two, and three dimensions and to communicate geometric ideas. In addition, students should be able to use informal reasoning to establish geometric relationships.

Data Analysis, Statistics, and Probability

This content area focuses on data representation and analysis across all disciplines and reflects the importance and prevalence of these activities in our society. Statistical knowledge and the ability to interpret data are necessary skills in the contemporary world. Questions emphasize appropriate methods for gathering data, the visual exploration of data, and the development and evaluation of arguments based on data analysis.

Algebra and Functions

This content area is broad in scope, covering algebraic and functional concepts in more informal, exploratory ways for the eighth-grade Trial State Assessment. Proficiency in this concept area requires both manipulative facility and conceptual understanding; it involves the ability to use algebra as a means of representation and algebraic processing as a problem-solving tool. Functions are viewed not only in terms of algebraic formulas, but also in terms of verbal descriptions, tables of values, and graphs.

FIGURE A2 | Mathematical Abilities

The following three categories of mathematical abilities are not to be construed as hierarchical. For example, problem solving involves interactions between conceptual knowledge and procedural skills, but what is considered complex problem solving at one grade level may be considered conceptual understanding or procedural knowledge at another.

Conceptual Understanding

Students demonstrate conceptual understanding in mathematics when they provide evidence that they can recognize, label, and generate examples and counterexamples of concepts; can use and interrelate models, diagrams, and varied representations of concepts; can identify and apply principles; know and can apply facts and definitions; can compare, contrast, and integrate related concepts and principles; can recognize, interpret, and apply the signs, symbols, and terms used to represent concepts; and can interpret the assumptions and relations involving concepts in mathematical settings. Such understandings are essential to performing procedures in a meaningful way and applying them in problem-solving situations.

Procedural Knowledge

Students demonstrate procedural knowledge in mathematics when they provide evidence of their ability to select and apply appropriate procedures correctly, verify and justify the correctness of a procedure using concrete models or symbolic methods, and extend or modify procedures to deal with factors inherent in problem settings. Procedural knowledge includes the various numerical algorithms in mathematics that have been created as tools to meet specific needs in an efficient manner. It also encompasses the abilities to read and produce graphs and tables, execute geometric constructions, and perform noncomputational skills such as rounding and ordering.

Problem Solving

In problem solving, students are required to use their reasoning and analytic abilities when they encounter new situations. Problem solving includes the ability to recognize and formulate problems; determine the sufficiency and consistency of data; use strategies, data, models, and relevant mathematics; generate, extend, and modify procedures; use reasoning (i.e., spatial, inductive, deductive, statistical, and proportional); and judge the reasonableness and correctness of solutions.

A scale ranging from 0 to 500 was created to report performance for each content area. Each content-area scale was based on the distribution of student performance across all three grades assessed in the 1990 national assessment (grades 4, 8, and 12) and had a mean of 250 and a standard deviation of 50.

A composite scale was created as an overall measure of students' mathematics proficiency. The composite scale was a weighted average of the five content area scales, where the weight for each content area was proportional to the relative importance assigned to the content area in the specifications developed by the Mathematics Objectives Panel.

Scale Anchoring

Scale anchoring is a method for defining performance along a scale. Traditionally, performance on educational scales has been defined by norm-referencing -- that is, by comparing students at a particular scale level to other students. In contrast, the NAEP scale anchoring is accomplished by describing what students at selected levels know and can do.

The scale anchoring process for the 1990 Trial State Assessment began with the selection of four levels -- 200, 250, 300, and 350 -- on the 0-to-500 scale. Although proficiency levels below 200 and above 350 could theoretically have been defined, they were not because so few students performed at the extreme ends of the scale. Any attempts to define levels at the extremes would therefore have been highly speculative.

To define performance at each of the four levels on the scale, NAEP analyzed sets of mathematics items from the 1990 assessment that discriminated well between adjacent levels. The criteria for selecting these "benchmark" items were as follows:

- To define performance at level 200, items were chosen that were answered correctly by at least 65 percent of the students whose proficiency was at or near 200 on the scale.

- To define performance at each of the higher levels on the scale, items were chosen that were: a) answered correctly by at least 65 percent of students whose proficiency was at or near that level; *and* b) answered incorrectly by a majority (at least 50 percent) of the students performing at or near the next lower level.

- The percentage of students at a level who answered the item correctly had to be at least 30 points higher than the percentage of students at the next lower level who answered it correctly.

Once these empirically selected sets of questions had been identified, mathematics educators analyzed the questions and used their expert judgment to characterize the knowledge, skills, and understandings of students performing at each level. Each of the four proficiency levels was defined by describing the types of mathematics questions that most students attaining that proficiency level would be able to perform successfully. Figure 3 in Chapter 1 provides a summary of the levels and their characteristic skills. Example questions for each level are provided in Figure A3, together with data on the estimated proportion of students at or above each of the four proficiency levels who correctly answered each question.[2]

Questionnaires for Teachers and Schools

As part of the Trial State Assessment, questionnaires were given to the mathematics teachers of assessed students and to the principal or other administrator in each participating school.

A Policy Analysis and Use Panel drafted a set of policy issues and guidelines and made recommendations concerning the design of these questionnaires. For the 1990 assessment, the teacher and school questionnaires focused on six educational areas: curriculum, instructional practices, teacher qualifications, educational standards and reform, school conditions, and conditions outside of the school that facilitate learning and instruction. Similar to the development of the materials given to students, the policy guidelines and the teacher and school questionnaires were prepared through an iterative process that involved extensive development, field testing, and review by external advisory groups.

MATHEMATICS TEACHER QUESTIONNAIRE

The questionnaire for eighth-grade mathematics teachers consisted of two parts. The first requested information about the teacher, such as race/ethnicity and gender, as well as academic degrees held, teaching certification, training in mathematics, and ability to get instructional resources. In the second part, teachers were asked to provide information on each class they taught that included one or more students who participated in the Trial State Assessment Program. The information included, among other things, the amount of time spent on mathematics instruction and homework, the extent to which textbooks or worksheets were used, the instructional emphasis placed on different mathematical topics, and the use of various instructional approaches. Because of the nature of the sampling for the Trial State Assessment, the responses to the mathematics teacher questionnaire do not necessarily represent all eighth-grade mathematics teachers in a state or territory. Rather, they represent the teachers of the particular students being assessed.

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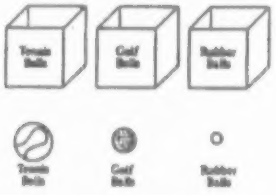
[2] Since there were insufficient numbers of eighth-grade questions at levels 200 and 350, one of the questions exemplifying level 200 is from the fourth-grade national assessment and one exemplifying level 350 is from the twelfth-grade national assessment.

FIGURE A3 | Example Items for Mathematics Proficiency Levels

Level 200: Simple Additive Reasoning and Problem Solving with Whole Numbers

EXAMPLE 1



Grade 4
Overall Percentage Correct: 73%
Percentage Correct for Anchor Levels:

200	250	300	350
65	91	100	—

7. Linda had three large boxes all the same size and three different kinds of balls as shown above. If she fills each box with the kind of balls shown, which box will have the fewest balls in it?

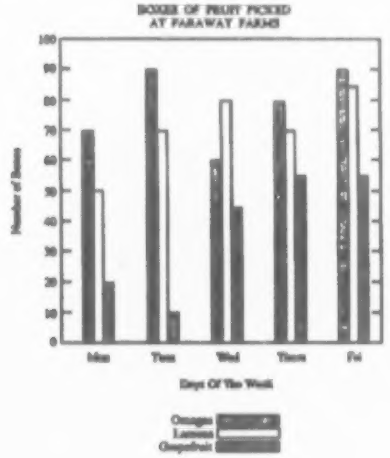
Ⓐ The box with the tennis balls

Ⓑ The box with the golf balls

Ⓒ The box with the rubber balls

Ⓓ You can't tell.

EXAMPLE 2



Grade 4
Overall Percentage Correct: 80%
Percentage Correct for Anchor Levels:

200	250	300	350
75	91	100	—

Grade 8
Overall Percentage Correct: 89%
Percentage Correct for Anchor Levels:

200	250	300	350
76	87	96	100

9. How many boxes of oranges were picked on Thursday?

Ⓐ 55

Ⓑ 60

Ⓒ 70

Ⓓ 80 *

Ⓔ 90

Ⓕ I don't know.

FIGURE A3 (continued) | Example Items for Mathematics Proficiency Levels

Level 250: Simple Multiplicative Reasoning and Two-Step Problem Solving

EXAMPLE 1

7. What is the value of $n + 5$ when $n = 3$?

Answer: ____________________

Grade 8
Overall Percentage Correct: 76%
Percentage Correct for Anchor Levels:

200	250	300	350
28	69	95	98

EXAMPLE 2

HAIR COLOR SURVEY RESULTS

Color of Hair	Percentage
Blond	17
Brown	50
Black	33
Totals	100

The table above shows the results of a survey of hair color. On the circle below, make a circle graph to illustrate the data in the table. Label each part of the circle graph with the correct hair color.

Did you use the calculator on this question?

○ Yes ○ No

Grade 8
Overall Percentage Correct: 73%
Percentage Correct for Anchor Levels:

200	250	300	350
21	68	92	92

EXAMPLE 3

6. Kathleen is packing baseballs into boxes. Each box holds 6 baseballs. She has 24 balls. Which number sentence will help her find out how many boxes she will need?

Ⓐ 24 − 6 = ☐
Ⓑ 24 ÷ 6 = ☐
Ⓒ 24 + 6 = ☐
Ⓓ 24 × 6 = ☐
Ⓔ I don't know.

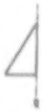
Grade 8
Overall Percentage Correct: 77%
Percentage Correct for Anchor Levels:

200	250	300	350
37	71	95	100

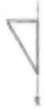
FIGURE A3 (continued) | Example Items for Mathematics Proficiency Levels

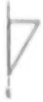
Level 300: Reasoning and Problem Solving Involving Fractions, Decimals, Percents, Elementary Geometric Properties, and Simple Algebraic Manipulations

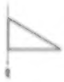
EXAMPLE 1

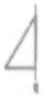


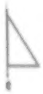
10. Which of the following shows the result of flipping the above triangle over the line ℓ?

Ⓐ


Ⓑ


Ⓒ


Ⓓ


Ⓔ


Grade 8
Overall Percentage Correct: 60%
Percentage Correct for Anchor Levels:

200	250	300	350
33	49	77	90

Grade 12
Overall Percentage Correct: 75%
Percentage Correct for Anchor Levels:

200	250	300	350
—	46	79	95

EXAMPLE 2

In the model town that a class is building, a car 15 feet long is represented by a scale model 3 inches long. If the same scale is used, a house 35 feet high would be represented by a scale model how many inches high?

Ⓐ $\frac{45}{35}$
Ⓑ 3
Ⓒ 5
Ⓓ 7
Ⓔ $\frac{35}{3}$

Did you use the calculator on this question?

○ Yes ○ No

Grade 8
Overall Percentage Correct: 59%
Percentage Correct for Anchor Levels:

200	250	300	350
17	46	86	99

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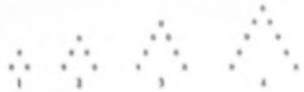
FIGURE A3 (continued) | Example Items for Mathematics Proficiency Levels

Level 350:	**Reasoning and Problem Solving Involving Geometric Relationships, Algebraic Equations, and Beginning Statistics and Probability**

EXAMPLE 1

▶ Questions 16-17 refer to the following pattern of dot-figures.



16. If this pattern of dot-figures is continued, how many dots will be in the 100th figure?

Ⓐ 100
Ⓑ 101
Ⓒ 199
Ⓓ 200
Ⓔ 201

Grade 8
Overall Percentage Correct: 34%
Percentage Correct for Anchor Levels:

200	250	300	350
13	19	53	88

Grade 12
Overall Percentage Correct: 49%
Percentage Correct for Anchor Levels:

200	250	300	350
—	22	48	90

EXAMPLE 2

17. Explain how you found your answer to question 16.

Answer ______________________________

Grade 8
Overall Percentage Correct: 15%
Percentage Correct for Anchor Levels:

200	250	300	350
1	4	28	74

Grade 12
Overall Percentage Correct: 27%
Percentage Correct for Anchor Levels:

200	250	300	350
—	3	22	74

SCHOOL CHARACTERISTICS AND POLICIES QUESTIONNAIRE

An extensive school questionnaire was completed by principals or other administrators in the schools participating in the Trial State Assessment. In addition to questions about the individuals who completed the questionnaires, there were questions about school policies, course offerings, and special priority areas, among other topics.

It is important to note that in this report, as in all NAEP reports, the student is always the unit of analysis, even when information from the teacher or school questionnaire is being reported. Having the student as the unit of analysis makes it possible to describe the instruction received by representative samples of eighth-grade students in public schools. Although this approach may provide a different perspective from that which would be obtained by simply collecting information from a sample of eighth-grade mathematics teachers or from a sample of schools, it is consistent with NAEP's goal of providing information about the educational context and performance of students.

Estimating Variability

The statistics reported by NAEP (average proficiencies, percentages of students at or above particular scale-score levels, and percentages of students responding in certain ways to background questions) are *estimates* of the corresponding information for the population of eighth-grade students in public schools in a state. These estimates are based on the performance of a carefully selected, representative *sample* of eighth-grade public-school students from the state or territory.

If a different representative sample of students were selected and the assessment repeated, it is likely that the estimates might vary somewhat, and both of these sample estimates might differ somewhat from the value of the mean or percentage that would be obtained if every eighth-grade public-school student in the state or territory were assessed. Virtually all statistics that are based on samples (including those in NAEP) are subject to a certain degree of uncertainty. The uncertainty attributable to using samples of students is referred to as *sampling error*.

Like almost all estimates based on assessment measures, NAEP's total group and subgroup proficiency estimates are subject to a second source of uncertainty, in addition to sampling error. As previously noted, each student who participated in the Trial State Assessment was administered a subset of questions from the total set of questions. If each student had been administered a different, but equally appropriate, set of the assessment questions -- or the entire set of questions -- somewhat different estimates of total group and subgroup proficiency might have been obtained. Thus, a second source of uncertainty arises because each student was administered a subset of the total pool of questions.

In addition to reporting estimates of average proficiencies, proportions of students at or above particular scale-score levels, and proportions of students giving various responses to background questions, this report also provides estimates of the magnitude of the uncertainty associated with these statistics. These measures of the uncertainty are called *standard errors* and are given in parentheses in each of the tables in the report. The standard errors of the estimates of mathematics proficiency statistics reflect both sources of uncertainty discussed above. The standard errors of the other statistics (such as the proportion of students answering a background question in a certain way or the proportion of students in certain racial/ethnic groups) reflect only sampling error. NAEP uses a methodology called the jackknife procedure to estimate these standard errors.

Drawing Inferences from the Results

One of the goals of the Trial State Assessment Program is to make inferences about the overall population of eighth-grade students in public schools in each participating state and territory based on the particular sample of students assessed. One uses the results from the sample -- taking into account the uncertainty associated with all samples -- to make inferences about the population.

The use of *confidence intervals*, based on the standard errors, provides a way to make inferences about the population means and proportions in a manner that reflects the uncertainty associated with the sample estimates. An estimated sample mean proficiency ± 2 standard errors represents a *95 percent confidence interval* for the corresponding population quantity. This means that with approximately 95 percent certainty, the average performance of the entire population of interest (e.g., all eighth-grade students in public schools in a state or territory) is within ± 2 standard errors of the sample mean.

As an example, suppose that the average mathematics proficiency of the students in a particular state's sample were 256 with a standard error of 1.2. A 95 percent confidence interval for the population quantity would be as follows:

$$\text{Mean} \pm 2 \text{ standard errors} = 256 \pm 2 \cdot (1.2) = 256 \pm 2.4 =$$

$$256 - 2.4 \text{ and } 256 + 2.4 = 253.6,\ 258.4$$

Thus, one can conclude with 95 percent certainty that the average proficiency for the entire population of eighth-grade students in public schools in that state is between 253.6 and 258.4.

Similar confidence intervals can be constructed for percentages, *provided that the percentages are not extremely large (greater than 90 percent) or extremely small (less than 10 percent)*. For extreme percentages, confidence intervals constructed in the above manner may not be appropriate and procedures for obtaining accurate confidence intervals are quite complicated.

Analyzing Subgroup Differences in Proficiencies and Proportions

In addition to the overall results, this report presents outcomes separately for a variety of important subgroups. Many of these subgroups are defined by shared characteristics of students, such as their gender, race/ethnicity, and the type of community in which their school is located. Other subgroups are defined by students' responses to background questions such as *About how much time do you usually spend each day on mathematics homework?* Still other subgroups are defined by the responses of the assessed students' mathematics teachers to questions in the mathematics teacher questionnaire.

As an example, one might be interested in answering the question: *Do students who reported spending 45 minutes or more doing mathematics homework each day exhibit higher average mathematics proficiency than students who reported spending 15 minutes or less?*

To answer the question posed above, one begins by comparing the average mathematics proficiency for the two groups being analyzed. If the mean for the group who reported spending 45 minutes or more on mathematics homework is higher, one may be tempted to conclude that that group does have higher achievement than the group who reported spending 15 minutes or less on homework. However, even though the means differ, there may be no real difference in performance between the two groups in the population because of the uncertainty associated with the estimated average proficiency of the groups in the sample. Remember that the intent is to make a statement about the entire population, not about the particular sample that was assessed. The data from the sample are used to make inferences about the population as a whole.

As discussed in the previous section, each estimated sample mean proficiency (or proportion) has a degree of uncertainty associated with it. It is therefore possible that if all students in the population had been assessed, rather than a sample of students, or if the assessment had been repeated with a different sample of students or a different, but equivalent, set of questions, the performances of various groups would have been different. Thus, to determine whether there is a *real* difference between the mean proficiency (or proportion of a certain attribute) for two groups in the population, one must obtain an estimate of the degree of uncertainty associated with the difference between the proficiency means or proportions of those groups for the sample. This estimate of the degree of uncertainty -- called *the standard error of the difference* between the groups -- is obtained by taking the square of each group's standard error, summing these squared standard errors, and then taking the square root of this sum.

Similar to the manner in which the standard error for an individual group mean or proportion is used, the *standard error of the difference* can be used to help determine whether differences between groups in the population are real. The difference between the mean proficiency or proportion of the two groups ± *2 standard errors of the difference* represents an approximate 95 percent confidence interval. If the resulting interval includes zero, one should conclude that there is insufficient evidence to claim a real difference between groups in the population. If the interval does not contain zero, the difference between groups is *statistically significant* (different) at the .05 level.

As an example, suppose that one were interested in determining whether the average mathematics proficiency of eighth-grade females is higher than that of eighth-grade males in a particular state's public schools. Suppose that the sample estimates of the mean proficiencies and standard errors for females and males were as follows:

Group	Average Proficiency	Standard Error
Female	259	2.0
Male	255	2.1

The difference between the estimates of the mean proficiencies [illegible] females and males is four points (259 - 255). The standard error of this difference is

$$\sqrt{2.0^2 + 2.1^2} = 2.9$$

Thus, an approximate 95 percent confidence interval for this difference is

$$\text{Mean difference} \pm 2 \text{ standard errors of the difference} =$$

$$4 \pm 2 \cdot (2.9) = 4 \pm 5.8 = 4 - 5.8 \text{ and } 4 + 5.8 = -1.8, 9.8$$

The value zero is within this confidence interval, which extends from -1.8 to 9.8 (i.e., zero is between -1.8 and 9.8). Thus, one should conclude that there is insufficient evidence to claim a difference in average mathematics proficiency between the population of eighth-grade females and males in public schools in the state.[3]

Throughout this report, when the mean proficiency or proportions for two groups were compared, procedures like the one described above were used to draw the conclusions that are presented. If a statement appears in the report indicating that a particular group had *higher (or lower)* average proficiency than a second group, the 95 percent confidence interval for the difference between groups did not contain zero. When a statement indicates that the average proficiency or proportion of some attribute was *about the same* for two groups, the confidence interval included zero, and thus no difference could be assumed between the groups. The reader is cautioned to avoid drawing conclusions solely on the basis of the magnitude of the differences. A difference between two groups in the sample that appears to be slight may represent a statistically significant difference in the population because of the magnitude of the standard errors. Conversely, a difference that appears to be large may not be statistically significant.

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[3] The procedure described above (especially the estimation of the standard error of the difference) is, in a strict sense, only appropriate when the statistics being compared come from independent samples. For certain comparisons in the report, the groups were not independent. In those cases, a different (and more appropriate) estimate of the *standard error of the difference* was used.

The procedures described in this section, and the certainty ascribed to intervals (e.g., a 95 percent confidence interval), are based on statistical theory that assumes that only one confidence interval or test of statistical significance is being performed. However, in each chapter of this report, many different groups are being compared (i.e., multiple sets of confidence intervals are being analyzed). When one considers sets of confidence intervals, statistical theory indicates that the certainty associated with the entire set of intervals is less than that attributable to each individual comparison from the set. If one wants to hold the certainty level for the set of comparisons at a particular level (e.g., .95), adjustments (called multiple comparison procedures) must be made to the methods described in the previous section. One such procedure -- the *Bonferroni method* -- was used in the analyses described in this report to form confidence intervals for the differences between groups whenever sets of comparisons were considered. Thus, the confidence intervals in the text that are based on sets of comparisons are more conservative than those described on the previous pages. A more detailed description of the use of the Bonferroni procedure appears in the Trial State Assessment technical report.

Statistics with Poorly Determined Standard Errors

The standard errors for means and proportions reported by NAEP are statistics and therefore are subject to a certain degree of uncertainty. In certain cases, typically when the standard error is based on a small number of students, or when the group of students is enrolled in a small number of schools, the amount of uncertainty associated with the standard errors may be quite large. Throughout this report, estimates of standard errors subject to a large degree of uncertainty are followed by the symbol "!". In such cases, the standard errors -- and any confidence intervals or significance tests involving these standard errors -- should be interpreted cautiously. Further details concerning procedures for identifying such standard errors are discussed in the Trial State Assessment technical report.

Minimum Subgroup Sample Sizes

Results for mathematics proficiency and background variables were tabulated and reported for groups defined by race/ethnicity and type of school community, as well as by gender and parents' education level. NAEP collects data for five racial/ethnic subgroups (White, Black, Hispanic, Asian/Pacific Islander, and American Indian/Alaskan Native) and four types of communities (Advantaged Urban, Disadvantaged Urban, Extreme Rural, and Other Communities). However, in many states or territories, and for some regions of the country, the number of students in some of these groups was not sufficiently high to permit accurate estimation of proficiency and/or background variable results. As a result, data are not provided for the subgroups with very small sample sizes. For results to be reported for any subgroup, a minimum sample size of 62 students was required. This number was determined by computing the sample size required to detect an effect size of .2 with a probability of .8 or greater.

The effect size of .2 pertains to the *true* difference between the average proficiency of the subgroup in question and the average proficiency for the total eighth-grade public-school population in the state or territory, divided by the standard deviation of the proficiency in the total population. If the *true* difference between subgroup and total group mean is .2 total-group standard deviation units, then a sample size of at least 62 is required to detect such a difference with a probability of .8. Further details about the procedure for determining minimum sample size appear in the Trial State Assessment technical report.

Describing the Size of Percentages

Some of the percentages reported in the text of the report are given quantitative descriptions. For example, the number of students being taught by teachers with master's degrees in mathematics might be described as "relatively few" or "almost all," depending on the size of the percentage in question. Any convention for choosing descriptive terms for the magnitude of percentages is to some degree arbitrary. The descriptive phrases used in the report and the rules used to select them are shown below.

Percentage	Description of Text in Report
$p = 0$	None
$0 < p \leq 10$	Relatively few
$10 < p \leq 20$	Some
$20 < p \leq 30$	About one-quarter
$30 < p \leq 44$	Less than half
$44 < p \leq 55$	About half
$55 < p \leq 69$	More than half
$69 < p \leq 79$	About three-quarters
$79 < p \leq 89$	Many
$89 < p < 100$	Almost all
$p = 100$	All

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DATA APPENDIX

For each of the tables in the main body of the report that presents mathematics proficiency results, this appendix contains corresponding data for each level of the four reporting subpopulations -- race/ethnicity, type of community, parents' education level, and gender.

TABLE A5 | Students' Reports on the Mathematics Class They Are Taking

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Eighth-grade Mathematics**	**Pre-algebra**	**Algebra**
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	49 (2.5) 248 (1.6)	24 (2.2) 275 (1.5)	25 (1.6) 296 (1.4)
Nation	62 (2.1) 251 (1.4)	19 (1.9) 272 (2.4)	15 (1.2) 296 (2.4)
RACE/ETHNICITY			
White			
State	45 (2.5) 254 (1.1)	25 (2.5) 279 (1.4)	27 (1.5) 299 (1.3)
Nation	59 (2.5) 259 (1.6)	21 (2.4) 277 (2.2)	17 (1.5) 300 (2.3)
Black			
State	65 (5.2) 226 (1.8)!	16 (4.0) *** (***)	16 (4.4) *** (***)
Nation	72 (4.7) 232 (3.4)	16 (3.0) 246 (6.4)	9 (2.2) *** (***)
Hispanic			
State	69 (4.2) 223 (3.7)	21 (3.9) *** (***)	8 (2.7) *** (***)
Nation	75 (4.4) 240 (2.4)	13 (3.9) *** (***)	6 (1.5) *** (***)
TYPE OF COMMUNITY			
Advantaged urban			
State	32 (8.2) 267 (3.3)!	37 (7.4) 287 (2.6)!	28 (4.2) 316 (3.0)!
Nation	55 (9.4) 269 (2.5)!	22 (7.9) *** (***)	21 (4.4) *** (***)
Disadvantaged urban			
State	65 (6.7) 230 (4.0)!	15 (5.2) *** (***)	17 (3.6) *** (***)
Nation	65 (6.0) 240 (4.0)!	16 (4.1) *** (***)	14 (3.3) 287 (4.2)!
Extreme rural			
State	49 (7.8) 252 (3.3)!	18 (6.5) *** (***)	32 (3.4) *** (***)
Nation	74 (4.5) 249 (3.1)!	14 (5.0) *** (***)	7 (2.2) *** (***)
Other			
State	48 (3.1) 251 (1.6)	23 (2.9) 275 (1.9)	26 (2.2) 295 (1.5)
Nation	61 (2.2) 251 (2.0)	20 (2.1) 272 (2.8)	16 (1.4) 294 (2.7)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. The percentages may not total 100 percent because a small number of students reported taking other mathematics courses. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A5
(continued)

Students' Reports on the Mathematics Class They Are Taking

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Eighth-grade Mathematics**	**Pre-algebra**	**Algebra**
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	49 (2.5)	24 (2.2)	25 (1.6)
	248 (1.6)	275 (1.5)	296 (1.4)
Nation	62 (2.1)	19 (1.9)	15 (1.2)
	251 (1.4)	272 (2.4)	296 (2.4)
PARENTS' EDUCATION			
HS non-graduate			
State	71 (4.5)	17 (3.1)	10 (2.8)
	239 (2.8)	*** (***)	*** (***)
Nation	77 (3.7)	13 (3.4)	3 (1.1)
	241 (2.1)	*** (***)	*** (***)
HS graduate			
State	58 (3.0)	23 (2.6)	15 (1.6)
	245 (1.6)	270 (1.9)	285 (2.1)
Nation	70 (2.6)	18 (2.4)	8 (1.1)
	249 (1.9)	266 (3.5)	277 (5.2)
Some college			
State	45 (2.9)	24 (2.8)	28 (2.0)
	254 (2.0)	277 (2.5)	294 (2.0)
Nation	60 (3.1)	21 (2.9)	15 (1.9)
	257 (2.1)	276 (2.8)	295 (3.2)
College graduate			
State	34 (3.0)	27 (2.7)	37 (2.4)
	256 (2.3)	282 (1.9)	304 (1.7)
Nation	53 (2.7)	21 (2.3)	24 (1.7)
	259 (1.5)	278 (2.8)	303 (2.3)
GENDER			
Male			
State	48 (3.0)	25 (2.3)	24 (1.7)
	250 (1.6)	278 (1.7)	301 (2.0)
Nation	63 (2.1)	18 (1.8)	15 (1.2)
	252 (1.6)	275 (2.9)	299 (2.5)
Female			
State	49 (2.7)	22 (2.5)	26 (2.0)
	245 (1.9)	273 (1.8)	292 (1.6)
Nation	61 (2.6)	20 (2.3)	15 (1.7)
	251 (1.5)	269 (3.0)	293 (2.8)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. The percentages may not total 100 percent because a small number of students reported taking other mathematics courses. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A6 | Teachers' Reports on the Amount of Time Students Spent on Mathematics Homework Each Day

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**None**	**15 Minutes**	**30 Minutes**	**45 Minutes**	**An Hour or More**
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL					
State	2 (0.7) *** (***)	41 (2.9) 258 (1.9)	44 (3.2) 274 (2.4)	12 (2.2) 274 (7.0)	2 (0.8) *** (***)
Nation	1 (0.3) *** (***)	43 (4.2) 256 (2.3)	43 (4.3) 266 (2.6)	10 (1.9) 272 (5.7)!	4 (0.9) 278 (5.1)!
RACE/ETHNICITY					
White					
State	1 (0.5) *** (***)	41 (3.0) 262 (1.4)	45 (3.2) 279 (1.8)	10 (2.1) 288 (4.3)!	2 (0.9) *** (***)
Nation	1 (0.3) *** (***)	39 (4.5) 266 (2.2)	45 (5.1) 270 (2.7)	11 (2.4) 277 (7.8)!	4 (0.9) 279 (5.8)!
Black					
State	5 (3.7) *** (***)	34 (6.9) 238 (4.5)!	42 (10.4) 242 (6.6)!	19 (8.6) *** (***)	0 (0.0) *** (***)
Nation	1 (0.7) *** (***)	55 (7.8) 232 (3.1)	40 (6.7) 248 (5.3)	3 (1.2) *** (***)	2 (0.8) *** (***)
Hispanic					
State	8 (4.3) *** (***)	55 (5.7) *** (***)	26 (5.9) *** (***)	11 (5.3) *** (***)	0 (0.0) *** (***)
Nation	1 (0.8) *** (***)	46 (7.8) 245 (3.0)!	34 (6.8) 251 (4.2)!	13 (2.9) *** (***)	7 (2.1) *** (***)
TYPE OF COMMUNITY					
Advantaged urban					
State	1 (0.7) *** (***)	39 (8.1) 273 (2.2)!	48 (9.3) 239 (4.6)!	12 (4.4) *** (***)	0 (0.0) *** (***)
Nation	1 (0.9) *** (***)	61 (11.3) 273 (3.1)!	32 (8.6) *** (***)	5 (3.4) *** (***)	0 (0.0) *** (***)
Disadvantaged urban					
State	5 (3.8) *** (***)	44 (8.5) 241 (7.8)!	40 (6.2) 250 (9.1)!	11 (5.2) *** (***)	0 (0.0) *** (***)
Nation	0 (0.0) *** (***)	41 (12.6) 236 (2.1)!	36 (9.4) 253 (9.0)!	12 (5.9) *** (***)	10 (6.2) *** (***)
Extreme rural					
State	1 (0.6) *** (***)	22 (9.7) *** (***)	61 (10.3) 272 (4.8)!	17 (9.9) *** (***)	0 (0.0) *** (***)
Nation	0 (0.0) *** (***)	68 (14.9) 253 (5.4)!	14 (10.9) *** (***)	8 (5.6) *** (***)	10 (7.3) *** (***)
Other					
State	2 (1.0) *** (***)	43 (3.6) 259 (1.9)	44 (3.6) 273 (2.8)	9 (2.3) 287 (5.4)!	2 (1.0) *** (***)
Nation	1 (0.4) *** (***)	37 (4.3) 256 (3.1)	49 (5.1) 265 (2.5)	10 (2.4) 276 (8.6)!	4 (1.1) 282 (11.6)!

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A6 (continued)

Teachers' Reports on the Amount of Time Students Spent on Mathematics Homework Each Day

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	None	15 Minutes	30 Minutes	45 Minutes	An Hour or More
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL					
State	2 (0.7) *** (***)	41 (2.9) 258 (1.9)	44 (3.2) 274 (2.4)	12 (2.2) 274 (7.0)	2 (0.8) *** (***)
Nation	1 (0.3) *** (***)	43 (4.2) 256 (2.3)	43 (4.3) 266 (2.6)	10 (1.9) 272 (5.7)!	4 (0.9) 276 (5.1)!
PARENTS' EDUCATION					
HS non-graduate					
State	2 (1.2) *** (***)	52 (5.4) 246 (4.5)	41 (5.0) *** (***)	5 (3.1) *** (***)	1 (0.7) *** (***)
Nation	1 (0.6) *** (***)	49 (6.3) 240 (2.8)	40 (6.1) 246 (3.7)	6 (1.7) *** (***)	4 (1.3) *** (***)
HS graduate					
State	2 (0.7) *** (***)	47 (3.8) 252 (1.9)	41 (3.7) 261 (2.2)	9 (2.3) 262 (8.7)!	1 (0.9) *** (***)
Nation	1 (0.5) *** (***)	43 (5.2) 249 (3.1)	44 (5.8) 258 (2.7)	9 (3.1) *** (***)	3 (1.0) *** (***)
Some college					
State	2 (1.6) *** (***)	43 (4.0) 264 (2.0)	40 (4.0) 276 (2.6)	13 (2.7) *** (***)	2 (1.0) *** (***)
Nation	1 (0.9) *** (***)	44 (5.4) 265 (2.6)	43 (5.8) 270 (3.6)	7 (2.1) *** (***)	4 (1.0) *** (***)
College graduate					
State	2 (0.7) *** (***)	33 (3.0) 268 (2.3)	51 (3.6) 289 (2.6)	13 (2.4) 287 (5.3)	2 (1.0) *** (***)
Nation	0 (0.3) *** (***)	40 (4.7) 265 (2.5)	44 (4.1) 277 (3.0)	11 (2.3) 287 (6.1)!	5 (1.3) *** (***)
GENDER					
Male					
State	2 (0.8) *** (***)	40 (3.0) 259 (2.1)	45 (3.4) 277 (2.5)	12 (2.4) 278 (7.2)!	1 (0.6) *** (***)
Nation	1 (0.3) *** (***)	44 (4.4) 257 (2.9)	43 (4.3) 268 (2.9)	9 (1.9) 273 (7.3)!	5 (1.3) 279 (7.7)!
Female					
State	2 (0.8) *** (***)	41 (3.0) 256 (2.2)	44 (3.2) 271 (2.6)	11 (2.1) 269 (7.5)	2 (1.0) *** (***)
Nation	1 (0.4) *** (***)	41 (4.4) 255 (2.3)	43 (4.7) 264 (2.8)	11 (2.0) 272 (5.7)!	4 (0.9) *** (***)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A7 | Students' Reports on the Amount of Time They Spent on Mathematics Homework Each Day

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	None	15 Minutes	30 Minutes	45 Minutes	An Hour or More
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL					
State	5 (0.5) 249 (3.5)	41 (1.1) 268 (1.6)	35 (0.7) 269 (1.9)	11 (0.7) 264 (2.8)	8 (0.6) 265 (3.1)
Nation	9 (0.8) 251 (2.8)	31 (2.0) 264 (1.9)	32 (1.2) 263 (1.9)	16 (1.0) 266 (1.9)	12 (1.1) 258 (3.1)
RACE/ETHNICITY					
White					
State	5 (0.6) 254 (3.3)	42 (1.1) 273 (1.3)	35 (0.9) 274 (1.5)	10 (0.7) 273 (2.2)	7 (0.7) 273 (2.4)
Nation	10 (1.0) 258 (3.4)	33 (2.4) 270 (1.9)	32 (1.3) 270 (2.1)	15 (0.9) 277 (2.2)	11 (1.3) 268 (3.3)
Black					
State	5 (1.6) *** (***)	35 (3.9) 239 (3.4)!	34 (2.9) 240 (4.0)	14 (1.9) *** (***)	11 (2.0) *** (***)
Nation	7 (1.5) *** (***)	26 (2.5) 241 (3.8)	33 (2.7) 237 (3.5)	18 (2.3) 240 (3.6)	16 (1.9) 232 (3.7)
Hispanic					
State	9 (3.7) *** (***)	33 (4.9) *** (***)	33 (3.9) *** (***)	18 (2.9) *** (***)	7 (2.1) *** (***)
Nation	12 (1.8) *** (***)	27 (3.0) 246 (3.6)	30 (2.6) 248 (3.4)	17 (2.1) 241 (4.3)	14 (1.7) *** (***)
TYPE OF COMMUNITY					
Advantaged urban					
State	2 (1.0) *** (***)	44 (3.6) 286 (2.6)!	37 (3.6) 293 (2.7)!	10 (1.2) *** (***)	6 (1.1) *** (***)
Nation	8 (2.5) *** (***)	41 (12.5) 278 (3.0)!	31 (6.6) 280 (4.6)!	12 (3.3) *** (***)	7 (3.4) *** (***)
Disadvantaged urban					
State	4 (1.4) *** (***)	43 (3.9) 251 (7.2)!	32 (2.6) 242 (5.9)!	12 (1.9) *** (***)	9 (2.0) *** (***)
Nation	12 (3.7) *** (***)	24 (3.3) 253 (4.9)!	31 (3.0) 247 (4.7)!	20 (1.9) 250 (4.8)!	14 (2.2) *** (***)
Extreme rural					
State	5 (1.3) *** (***)	44 (4.0) 269 (3.5)!	31 (2.9) *** (***)	13 (3.7) *** (***)	7 (0.8) *** (***)
Nation	8 (2.3) *** (***)	36 (4.6) 260 (3.5)!	31 (2.9) 255 (5.1)!	18 (3.8) *** (***)	7 (2.7) *** (***)
Other					
State	6 (0.7) 250 (4.0)	39 (1.4) 269 (1.6)	35 (1.0) 268 (1.9)	11 (0.9) 267 (3.0)	8 (0.9) 269 (2.9)
Nation	9 (1.0) 250 (3.8)	30 (1.8) 263 (2.3)	32 (1.3) 264 (2.3)	15 (1.1) 267 (2.1)	13 (1.1) 258 (3.6)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A7 (continued) | Students' Reports on the Amount of Time They Spent on Mathematics Homework Each Day

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	None	15 Minutes	30 Minutes	45 Minutes	An Hour or More
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL					
State	5 (0.5) 249 (3.5)	41 (1.1) 268 (1.6)	35 (0.7) 269 (1.9)	11 (0.7) 264 (2.8)	8 (0.6) 265 (3.1)
Nation	9 (0.8) 251 (2.8)	31 (2.0) 264 (1.9)	32 (1.2) 263 (1.9)	16 (1.0) 266 (1.9)	12 (1.1) 258 (3.1)
PARENTS' EDUCATION					
HS non-graduate					
State	8 (2.1) *** (***)	47 (3.7) 253 (3.2)	29 (3.4) *** (***)	9 (2.2) *** (***)	7 (1.8) *** (***)
Nation	17 (3.0) *** (***)	26 (3.3) 246 (4.0)	34 (4.4) 246 (2.6)	12 (2.5) *** (***)	10 (2.2) *** (***)
HS graduate					
State	5 (0.9) *** (***)	42 (2.0) 260 (1.7)	36 (1.4) 257 (2.2)	9 (1.2) 250 (3.3)	8 (1.0) *** (***)
Nation	10 (1.7) 246 (4.2)	33 (2.2) 259 (3.2)	31 (1.9) 254 (2.4)	13 (1.4) 256 (2.8)	11 (1.5) 244 (3.4)
Some college					
State	6 (1.2) *** (***)	39 (2.2) 270 (2.1)	35 (2.2) 272 (2.4)	12 (1.3) *** (***)	8 (1.3) *** (***)
Nation	9 (1.2) *** (***)	30 (2.7) 266 (3.0)	36 (2.1) 266 (2.6)	14 (1.8) 274 (3.5)	11 (1.5) *** (***)
College graduate					
State	3 (0.6) *** (***)	40 (1.8) 281 (2.5)	36 (1.5) 284 (2.3)	14 (1.2) 276 (3.8)	8 (0.9) 282 (3.2)
Nation	7 (0.9) 265 (3.6)	31 (3.4) 275 (2.0)	31 (2.0) 275 (2.5)	18 (1.2) 278 (3.2)	14 (1.9) 271 (2.8)
GENDER					
Male					
State	7 (0.8) 250 (3.2)	44 (1.6) 271 (1.9)	30 (1.3) 272 (2.1)	12 (1.0) 266 (3.9)	7 (0.9) 271 (4.5)
Nation	11 (1.1) 255 (3.9)	34 (2.4) 264 (2.8)	29 (1.3) 266 (2.4)	15 (1.2) 265 (3.0)	11 (1.4) 258 (4.1)
Female					
State	3 (0.6) *** (***)	37 (1.3) 264 (2.0)	39 (1.2) 266 (2.3)	11 (1.0) 262 (3.8)	9 (0.8) 261 (3.2)
Nation	7 (0.9) 246 (4.1)	28 (2.0) 263 (1.5)	35 (1.7) 260 (2.0)	17 (1.0) 267 (2.4)	13 (1.3) 258 (3.3)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A8 | Teachers' Reports on the Emphasis Given To Specific Mathematics Content Areas

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Numbers and Operations		Measurement		Geometry	
	Heavy Emphasis	Little or No Emphasis	Heavy Emphasis	Little or No Emphasis	Heavy Emphasis	Little or No Emphasis
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL						
State	47 (3.0)	19 (2.3)	15 (2.2)	43 (2.9)	17 (2.7)	34 (3.0)
	260 (1.7)	293 (3.9)	252 (3.7)	276 (3.9)	259 (2.8)	270 (4.3)
Nation	49 (3.8)	15 (2.1)	17 (3.0)	33 (4.0)	28 (3.8)	21 (3.3)
	260 (1.8)	287 (3.4)	250 (5.6)	272 (4.0)	260 (3.2)	264 (5.4)
RACE/ETHNICITY						
White						
State	46 (3.1)	20 (2.4)	15 (2.2)	44 (2.9)	17 (3.1)	32 (2.9)
	266 (1.2)	298 (2.1)	258 (3.1)	284 (2.4)	265 (2.1)	278 (2.3)
Nation	48 (3.7)	16 (2.4)	14 (3.4)	36 (4.7)	27 (4.4)	22 (3.4)
	267 (2.2)	289 (3.5)	259 (6.9)!	277 (4.3)	265 (3.3)	273 (5.8)
Black						
State	49 (9.3)	11 (7.2)	17 (8.0)	40 (9.0)	17 (5.1)	43 (11.3)
	237 (3.5)!	*** (***)	*** (***)	229 (9.9)!	*** (***)	232 (9.7)!
Nation	54 (7.9)	11 (3.3)	25 (7.4)	23 (5.7)	33 (7.9)	24 (7.3)
	243 (4.3)	*** (***)	228 (2.8)!	238 (8.1)!	242 (5.6)!	233 (4.7)!
Hispanic						
State	68 (6.0)	9 (4.7)	15 (6.1)	34 (10.1)	16 (4.8)	30 (9.9)
	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Nation	47 (8.7)	8 (2.2)	23 (4.1)	34 (5.8)	27 (6.8)	16 (5.5)
	246 (4.6)	*** (***)	*** (***)	255 (4.4)!	*** (***)	*** (***)
TYPE OF COMMUNITY						
Advantaged urban						
State	41 (5.6)	18 (5.9)	9 (4.4)	45 (7.5)	27 (7.0)	30 (4.8)
	280 (3.5)!	*** (***)	*** (***)	309 (6.5)!	276 (5.9)!	300 (4.2)!
Nation	28 (13.0)	16 (4.2)	9 (7.0)	40 (8.5)	38 (9.4)	13 (3.2)
	*** (***)	*** (***)	*** (***)	*** (***)	267 (4.9)!	*** (***)
Disadvantaged urban						
State	40 (9.5)	19 (6.1)	14 (7.2)	51 (12.6)	17 (6.8)	34 (11.0)
	231 (5.5)!	*** (***)	*** (***)	246 (16.2)!	*** (***)	237 (16.7)!
Nation	48 (12.1)	9 (4.0)	39 (10.3)	21 (6.5)	33 (11.8)	18 (7.6)
	255 (6.3)!	*** (***)	238 (8.4)!	*** (***)	248 (8.2)!	*** (***)
Extreme rural						
State	44 (14.3)	22 (7.1)	25 (9.6)	24 (4.8)	13 (6.0)	52 (10.3)
	262 (4.2)!	*** (***)	*** (***)	*** (***)	*** (***)	270 (5.7)!
Nation	53 (12.4)	6 (3.6)	6 (4.9)	32 (11.7)	9 (6.1)	16 (7.9)
	257 (7.1)!	*** (***)	*** (***)	265 (9.1)!	*** (***)	*** (***)
Other						
State	51 (3.6)	18 (2.7)	16 (2.8)	43 (3.9)	16 (3.7)	30 (3.3)
	261 (1.7)	295 (2.6)	253 (3.9)	277 (3.1)	258 (3.6)!	276 (2.9)
Nation	52 (4.1)	16 (2.7)	16 (3.9)	34 (5.3)	28 (4.6)	24 (4.3)
	260 (2.3)	286 (3.6)	253 (7.1)!	270 (4.6)	260 (3.9)	265 (5.7)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. The percentages may not total 100 percent because the "Moderate emphasis" category is not included. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A8 (continued) | Teachers' Reports on the Emphasis Given to Specific Mathematics Content Areas

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Numbers and Operations		Measurement		Geometry	
	Heavy Emphasis	Little or No Emphasis	Heavy Emphasis	Little or No Emphasis	Heavy Emphasis	Little or No Emphasis
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL						
State	47 (3.0)	19 (2.3)	15 (2.2)	43 (2.9)	17 (2.7)	34 (3.0)
	260 (1.7)	293 (3.9)	252 (3.7)	276 (3.9)	259 (2.6)	270 (4.3)
Nation	49 (3.8)	15 (2.1)	17 (3.0)	33 (4.0)	26 (3.8)	21 (3.3)
	260 (1.8)	287 (3.4)	250 (5.6)	272 (4.0)	260 (3.2)	264 (5.4)
PARENTS' EDUCATION						
HS non-graduate						
State	63 (4.2)	8 (2.8)	23 (4.4)	30 (6.5)	18 (4.6)	33 (7.1)
	250 (3.6)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Nation	60 (6.9)	7 (2.3)	22 (5.3)	25 (5.3)	32 (6.3)	20 (6.7)
	251 (3.4)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
HS graduate						
State	53 (3.8)	13 (2.2)	19 (2.6)	36 (3.3)	18 (3.3)	26 (3.0)
	256 (2.1)	282 (4.6)	249 (4.7)	261 (4.2)	254 (3.4)	257 (4.3)
Nation	55 (4.8)	11 (2.8)	17 (3.9)	27 (5.0)	27 (4.5)	24 (5.1)
	259 (2.9)	*** (***)	251 (6.1)!	253 (4.7)!	255 (4.2)	246 (4.8)!
Some college						
State	47 (4.5)	20 (2.9)	13 (2.7)	45 (3.8)	20 (3.5)	35 (4.0)
	265 (2.3)	296 (3.8)	*** (***)	276 (4.6)	261 (3.2)	274 (4.6)
Nation	47 (4.4)	17 (3.3)	12 (2.7)	39 (5.5)	27 (5.0)	23 (4.1)
	265 (2.6)	284 (4.1)!	*** (***)	279 (4.5)	262 (4.8)!	270 (4.7)
College graduate						
State	39 (3.1)	26 (3.4)	12 (2.3)	51 (3.3)	16 (2.6)	40 (3.4)
	271 (2.7)	301 (3.6)	261 (6.7)	294 (3.9)	268 (4.1)	284 (3.7)
Nation	44 (4.1)	19 (2.4)	16 (3.3)	37 (3.8)	26 (3.4)	21 (2.9)
	269 (2.6)	298 (3.4)	264 (7.2)!	283 (3.8)	270 (3.8)	280 (6.4)
GENDER						
Male						
State	47 (3.3)	19 (2.5)	16 (2.5)	43 (3.2)	17 (2.8)	34 (3.1)
	261 (2.0)	296 (4.9)	257 (4.4)	282 (4.2)	260 (3.3)	271 (4.7)
Nation	48 (4.1)	14 (2.1)	17 (3.3)	32 (3.9)	29 (4.1)	20 (3.3)
	261 (2.5)	287 (4.4)	258 (6.7)	275 (4.8)	263 (3.8)	266 (6.8)
Female						
State	48 (3.1)	19 (2.3)	15 (2.3)	43 (3.1)	17 (2.7)	33 (3.2)
	259 (1.8)	290 (3.9)	248 (4.1)	271 (4.2)	258 (3.1)	268 (4.4)
Nation	51 (3.9)	15 (2.4)	17 (3.2)	35 (4.3)	27 (3.9)	23 (3.5)
	260 (2.0)	286 (3.3)	241 (5.4)	268 (4.1)	256 (3.3)	263 (5.0)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. The percentages may not total 100 percent because the "Moderate emphasis" category is not included. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A8
(continued)

Teachers' Reports on the Emphasis Given To Specific Mathematics Content Areas

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Data Analysis, Statistics, and Probability**		**Algebra and Functions**	
	Heavy Emphasis	Little or No Emphasis	Heavy Emphasis	Little or No Emphasis
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL				
State	6 (1.1) 266 (3.5)	77 (2.6) 269 (2.4)	48 (2.8) 283 (1.9)	20 (2.3) 237 (2.6)
Nation	14 (2.2) 269 (4.3)	53 (4.4) 261 (2.9)	46 (3.6) 275 (2.5)	20 (3.0) 243 (3.0)
RACE/ETHNICITY				
White				
State	6 (1.2) 274 (2.5)	78 (2.5) 275 (1.4)	50 (2.8) 286 (1.7)	17 (2.0) 244 (2.1)
Nation	14 (2.4) 276 (4.1)	53 (5.0) 271 (3.1)	48 (4.2) 281 (3.0)	18 (2.8) 251 (3.3)
Black				
State	6 (2.4) *** (***)	70 (6.8) 234 (6.8)!	38 (7.2) 255 (6.4)	34 (10.2) 221 (5.9)!
Nation	14 (3.4) *** (***)	53 (8.2) 225 (4.3)	39 (7.1) 253 (6.3)	27 (6.9) 226 (2.2)!
Hispanic				
State	10 (3.2) *** (***)	65 (10.1) *** (***)	28 (6.2) *** (***)	44 (5.9) *** (***)
Nation	15 (4.1) *** (***)	56 (6.3) 246 (4.4)	46 (5.9) 257 (4.0)!	18 (4.2) *** (***)
TYPE OF COMMUNITY				
Advantaged urban				
State	11 (5.8) *** (***)	60 (8.5) 290 (3.5)!	67 (4.8) 295 (3.6)!	11 (2.1) *** (***)
Nation	11 (6.6) *** (***)	65 (19.4) 284 (7.4)!	41 (8.9) 296 (7.9)!	18 (5.3) *** (***)
Disadvantaged urban				
State	7 (3.3) *** (***)	73 (11.4) 248 (9.7)!	30 (6.2) 276 (9.2)!	39 (8.5) 226 (9.5)!
Nation	19 (9.4) *** (***)	34 (11.4) 236 (8.2)!	53 (11.8) 254 (6.3)!	20 (9.4) *** (***)
Extreme rural				
State	7 (7.5) *** (***)	86 (8.2) 274 (3.7)!	69 (6.6) 277 (3.5)!	9 (5.8) *** (***)
Nation	5 (5.4) *** (***)	65 (16.9) 254 (6.7)!	33 (8.1) *** (***)	42 (16.0) 241 (5.9)!
Other				
State	5 (0.8) 266 (2.9)	80 (2.7) 271 (2.1)	48 (3.5) 282 (2.7)	17 (2.5) 242 (2.4)
Nation	15 (2.9) 267 (4.7)	53 (5.2) 260 (3.4)	47 (4.3) 276 (2.8)	17 (3.3) 245 (4.4)!

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. The percentages may not total 100 percent because the "Moderate emphasis" category is not included. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A8 (continued) | Teachers' Reports on the Emphasis Given To Specific Mathematics Content Areas

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Data Analysis, Statistics, and Probability		Algebra and Functions	
	Heavy Emphasis	Little or No Emphasis	Heavy Emphasis	Little or No Emphasis
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL				
State	6 (1.1) 266 (3.5)	77 (2.6) 269 (2.4)	48 (2.8) 283 (1.9)	20 (2.3) 237 (2.8)
Nation	14 (2.2) 269 (4.3)	53 (4.4) 261 (2.9)	46 (3.6) 275 (2.5)	20 (3.0) 243 (3.0)
PARENTS' EDUCATION				
HS non-graduate				
State	9 (3.0) *** (***)	73 (5.6) 246 (5.0)	30 (4.6) *** (***)	29 (4.8) *** (***)
Nation	9 (3.0) *** (***)	53 (7.7) 240 (6.2)	28 (5.2) *** (***)	29 (6.9) *** (***)
HS graduate				
State	7 (1.1) *** (***)	75 (2.8) 260 (2.3)	41 (3.4) 271 (3.3)	22 (2.5) 233 (3.5)
Nation	17 (3.7) 261 (6.0)!	54 (5.4) 247 (2.9)	44 (4.8) 265 (3.5)	23 (3.9) 239 (3.4)
Some college				
State	6 (1.4) *** (***)	81 (2.9) 274 (2.4)	51 (3.7) 283 (2.3)	18 (2.9) 246 (4.5)
Nation	13 (2.5) *** (***)	57 (5.8) 270 (3.7)	48 (4.8) 278 (3.0)	17 (3.1) *** (***)
College graduate				
State	5 (1.4) *** (***)	76 (3.5) 284 (2.9)	60 (3.4) 293 (1.9)	14 (2.2) 242 (4.9)
Nation	15 (2.4) 282 (4.5)	53 (4.4) 275 (3.8)	50 (3.9) 268 (3.0)	18 (2.4) 249 (4.0)
GENDER				
Male				
State	6 (1.3) 267 (4.9)!	77 (2.7) 273 (2.5)	48 (3.0) 283 (2.4)	20 (2.5) 235 (2.7)
Nation	13 (2.2) 275 (5.8)	54 (4.7) 260 (3.5)	44 (4.1) 276 (3.2)	22 (3.6) 243 (3.0)
Female				
State	7 (1.2) 266 (4.7)	76 (2.7) 266 (2.7)	49 (3.1) 282 (1.9)	20 (2.3) 239 (3.3)
Nation	16 (2.4) 263 (4.4)	53 (4.5) 262 (2.8)	48 (3.6) 274 (2.7)	18 (2.9) 244 (3.9)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. The percentages may not total 100 percent because the "Moderate emphasis" category is not included. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A9 | Teachers' Reports on the Availability of Resources

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	I Get All the Resources I Need	I Get Most of the Resources I Need	I Get Some or None of the Resources I Need
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	19 (3.6) 274 (3.6)	52 (3.6) 267 (1.8)	29 (3.3) 259 (3.7)
Nation	13 (2.4) 265 (4.2)	56 (4.0) 265 (2.0)	31 (4.2) 261 (2.9)
RACE/ETHNICITY			
White			
State	21 (3.9) 276 (3.1)	56 (3.6) 271 (1.4)	23 (3.2) 273 (2.3)
Nation	11 (2.5) 275 (3.5)!	58 (4.6) 270 (2.3)	30 (4.6) 267 (3.3)
Black			
State	9 (4.0) *** (***)	26 (7.0) 240 (4.4)!	65 (6.9) 236 (4.8)!
Nation	15 (4.2) 241 (5.3)!	52 (6.6) 242 (2.4)	33 (7.2) 236 (4.9)
Hispanic			
State	10 (3.4) *** (***)	53 (8.0) *** (***)	37 (7.0) *** (***)
Nation	23 (7.6) 246 (7.7)!	44 (4.9) 250 (2.9)	34 (7.7) 244 (3.0)!
TYPE OF COMMUNITY			
Advantaged urban			
State	36 (10.1) 289 (4.8)!	42 (9.6) 290 (3.8)!	22 (11.4) 283 (6.5)!
Nation	38 (9.2) 272 (8.5)!	59 (8.9) 286 (1.3)!	3 (3.1) *** (***)
Disadvantaged urban			
State	9 (4.4) *** (***)	31 (9.9) 256 (7.9)!	60 (11.2) 236 (5.3)!
Nation	10 (6.8) *** (***)	40 (13.1) 251 (5.4)!	50 (14.5) 253 (5.5)!
Extreme rural			
State	17 (13.1) *** (***)	62 (13.0) 271 (5.4)!	21 (9.2) *** (***)
Nation	2 (2.6) *** (***)	54 (10.4) 260 (8.8)!	43 (10.3) 257 (5.0)!
Other			
State	20 (5.2) 271 (4.7)!	56 (5.2) 266 (1.2)	24 (4.0) 269 (3.5)!
Nation	11 (2.9) 265 (3.9)!	58 (5.4) 264 (2.1)	31 (5.6) 263 (4.2)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A9 (continued) | Teachers' Reports on the Availability of Resources

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	I Get All the Resources I Need	I Get Most of the Resources I Need	I Get Some or None of the Resources I Need
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	19 (3.6)	52 (3.6)	29 (3.3)
	274 (3.6)	267 (1.8)	259 (3.7)
Nation	13 (2.4)	56 (4.0)	31 (4.2)
	265 (4.2)	265 (2.0)	261 (2.9)
PARENTS' EDUCATION			
HS non-graduate			
State	23 (6.8)	48 (5.6)	30 (5.6)
	*** (***)	248 (3.9)	*** (***)
Nation	8 (2.6)	54 (5.7)	38 (6.3)
	*** (***)	244 (2.7)	243 (3.5)!
HS graduate			
State	20 (4.4)	51 (4.2)	29 (3.6)
	261 (3.9)!	257 (1.8)	252 (3.3)
Nation	10 (2.5)	54 (4.9)	35 (4.9)
	253 (4.8)!	256 (1.9)	256 (2.8)
Some college			
State	15 (3.1)	55 (3.9)	29 (4.0)
	279 (3.2)	271 (1.5)	265 (4.0)
Nation	13 (3.3)	62 (4.3)	25 (4.1)
	*** (***)	269 (2.5)	267 (3.8)
College graduate			
State	20 (3.7)	54 (3.9)	26 (3.7)
	291 (4.1)	280 (2.5)	274 (4.0)
Nation	15 (2.9)	56 (4.9)	30 (5.1)
	276 (5.4)!	276 (2.2)	273 (3.7)
GENDER			
Male			
State	21 (3.9)	52 (3.7)	27 (3.1)
	275 (4.0)	269 (2.1)	264 (3.7)
Nation	13 (2.6)	57 (4.0)	30 (4.0)
	264 (5.0)!	265 (2.6)	264 (3.3)
Female			
State	18 (3.5)	52 (3.7)	30 (3.7)
	271 (4.0)	266 (1.8)	255 (4.1)
Nation	13 (2.4)	55 (4.4)	32 (4.7)
	266 (3.9)	264 (2.0)	257 (3.0)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A10a | Teachers' Reports on the Frequency of Small Group Work

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	At Least Once a Week	Less Than Once a Week	Never
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	33 (3.3) 265 (2.9)	46 (3.2) 268 (2.2)	21 (3.2) 269 (4.2)
Nation	50 (4.4) 260 (2.2)	43 (4.1) 264 (2.3)	8 (2.0) 277 (5.4)!
RACE/ETHNICITY			
White			
State	32 (3.1) 271 (2.1)	47 (3.4) 273 (1.7)	21 (3.3) 275 (2.2)
Nation	49 (4.6) 265 (2.7)	43 (4.5) 271 (2.2)	8 (2.3) 285 (4.9)!
Black			
State	34 (8.7) 233 (7.9)!	44 (10.0) 239 (4.7)!	22 (10.1) *** (***)
Nation	47 (8.1) 240 (3.4)	45 (7.0) 238 (4.0)	9 (4.1) *** (***)
Hispanic			
State	36 (8.6) *** (***)	44 (8.0) *** (***)	20 (6.0) *** (***)
Nation	64 (7.2) 246 (2.5)	32 (6.9) 247 (6.3)!	4 (1.4) *** (***)
TYPE OF COMMUNITY			
Advantaged urban			
State	48 (8.5) 287 (4.8)!	31 (5.7) 291 (5.1)!	20 (6.5) *** (***)
Nation	39 (22.9) *** (***)	41 (17.9) 273 (6.0)!	20 (12.2) *** (***)
Disadvantaged urban			
State	41 (12.2) 242 (12.6)!	56 (11.2) 251 (7.3)!	3 (2.2) *** (***)
Nation	70 (11.7) 248 (4.8)!	21 (9.0) 249 (8.7)!	9 (8.5) *** (***)
Extreme rural			
State	37 (14.3) 269 (10.6)!	28 (10.6) *** (***)	35 (14.2) 274 (9.3)!
Nation	35 (14.6) 255 (5.5)!	56 (17.1) 258 (5.9)!	9 (9.6) *** (***)
Other			
State	29 (3.7) 264 (3.0)	49 (4.1) 269 (2.4)	22 (3.7) 273 (2.8)!
Nation	50 (4.4) 260 (2.4)	44 (4.5) 264 (2.8)	6 (1.8) 277 (8.3)!

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A10a (continued) | Teachers' Reports on the Frequency of Small Group Work

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	At Least Once a Week	Less Than Once a Week	Never
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL			
State	33 (3.3)	46 (3.2)	21 (3.2)
	265 (2.9)	268 (2.2)	269 (4.2)
Nation	50 (4.4)	43 (4.1)	8 (2.0)
	260 (2.2)	264 (2.3)	277 (5.4)!
PARENTS' EDUCATION			
HS non-graduate			
State	37 (6.8)	42 (6.4)	21 (5.9)
	*** (***)	*** (***)	*** (***)
Nation	60 (6.4)	39 (6.5)	1 (1.4)
	244 (3.2)	244 (3.2)!	*** (***)
HS graduate			
State	35 (4.0)	45 (3.8)	20 (3.5)
	254 (2.7)	257 (2.2)	260 (3.7)
Nation	49 (4.8)	45 (5.1)	6 (2.5)
	252 (2.8)	257 (2.7)	*** (***)
Some college			
State	31 (3.8)	50 (4.2)	19 (3.2)
	270 (3.7)	270 (2.5)	274 (4.0)
Nation	51 (5.2)	42 (5.1)	7 (2.3)
	266 (3.1)	268 (3.2)	*** (***)
College graduate			
State	30 (3.8)	46 (3.7)	24 (3.8)
	282 (2.9)	281 (2.9)	282 (4.5)
Nation	46 (5.2)	43 (4.4)	11 (2.7)
	271 (2.6)	276 (3.0)	285 (4.9)!
GENDER			
Male			
State	34 (3.5)	45 (3.1)	21 (3.3)
	266 (2.8)	271 (2.2)	274 (5.0)
Nation	50 (4.5)	42 (4.0)	8 (2.1)
	261 (3.0)	265 (3.1)	278 (5.3)!
Female			
State	32 (3.3)	47 (3.7)	22 (3.3)
	265 (3.3)	264 (2.6)	265 (3.9)
Nation	50 (4.7)	43 (4.7)	7 (2.1)
	259 (2.2)	263 (2.1)	275 (6.6)!

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A10b | Teachers' Reports on the Use of Mathematical Objects

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	At Least Once a Week	Less Than Once a Week	Never
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL			
State	11 (1.7)	67 (3.1)	22 (3.1)
	258 (4.0)	266 (1.9)	276 (5.7)
Nation	22 (3.7)	69 (3.9)	9 (2.6)
	254 (3.2)	263 (1.9)	282 (5.9)!
RACE/ETHNICITY			
White			
State	10 (1.8)	69 (3.2)	21 (3.1)
	267 (4.3)	270 (1.4)	286 (2.5)
Nation	17 (4.0)	72 (4.2)	10 (2.7)
	261 (3.8)!	269 (2.1)	288 (6.2)!
Black			
State	19 (4.7)	51 (12.1)	30 (12.6)
	*** (***)	240 (5.6)!	*** (***)
Nation	22 (5.9)	70 (6.3)	8 (3.9)
	233 (5.9)!	241 (2.9)	*** (***)
Hispanic			
State	11 (2.6)	68 (8.5)	20 (8.9)
	*** (***)	*** (***)	*** (***)
Nation	39 (7.5)	55 (7.3)	7 (2.6)
	247 (3.8)	245 (3.8)!	*** (***)
TYPE OF COMMUNITY			
Advantaged urban			
State	12 (6.5)	68 (7.3)	20 (7.8)
	*** (***)	286 (3.5)!	*** (***)
Nation	23 (14.4)	63 (11.5)	15 (9.3)
	*** (***)	278 (5.6)!	*** (***)
Disadvantaged urban			
State	9 (3.5)	71 (10.0)	21 (10.3)
	*** (***)	246 (8.6)!	*** (***)
Nation	39 (11.4)	59 (12.1)	2 (1.8)
	247 (7.5)!	253 (7.0)!	*** (***)
Extreme rural			
State	6 (4.9)	70 (14.5)	24 (10.2)
	*** (***)	265 (4.5)!	*** (***)
Nation	27 (14.9)	65 (14.6)	8 (3.9)
	*** (***)	262 (2.8)!	*** (***)
Other			
State	11 (2.5)	68 (3.9)	20 (3.9)
	258 (5.5)!	267 (1.6)	283 (3.6)!
Nation	19 (4.3)	72 (5.0)	9 (3.3)
	253 (3.9)!	263 (2.2)	281 (7.1)!

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A10b (continued) | Teachers' Reports on the Use of Mathematical Objects

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	At Least Once a Week	Less Than Once a Week	Never
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	11 (1.7) 258 (4.0)	67 (3.1) 266 (1.9)	22 (3.1) 276 (5.7)
Nation	22 (3.7) 254 (3.2)	69 (3.9) 263 (1.9)	9 (2.6) 282 (5.9)!
PARENTS' EDUCATION			
HS non-graduate			
State	15 (4.0) *** (***)	72 (6.3) 254 (3.8)	14 (6.3) *** (***)
Nation	25 (5.6) *** (***)	66 (7.2) 243 (2.2)	9 (6.5) *** (***)
HS graduate			
State	12 (1.9) 252 (4.1)	70 (3.5) 257 (1.8)	18 (3.2) 263 (4.8)
Nation	23 (4.8) 246 (4.0)!	70 (5.3) 255 (2.2)	7 (2.8) *** (***)
Some college			
State	10 (2.0) *** (***)	67 (4.2) 271 (1.9)	23 (3.9) 277 (5.5)
Nation	18 (4.0) 261 (4.4)!	73 (4.3) 269 (2.3)	9 (2.4) *** (***)
College graduate			
State	11 (2.1) 273 (6.9)!	63 (3.4) 279 (2.2)	27 (3.6) 293 (3.7)
Nation	20 (3.9) 266 (3.5)!	69 (3.7) 274 (2.2)	11 (2.5) 297 (4.2)!
GENDER			
Male			
State	12 (1.9) 257 (4.3)	65 (3.2) 269 (2.0)	23 (3.0) 279 (5.9)
Nation	22 (4.1) 255 (4.1)	69 (4.1) 265 (2.1)	8 (2.0) 287 (7.2)!
Female			
State	11 (1.7) 260 (4.3)	68 (3.4) 263 (2.2)	21 (3.4) 273 (6.1)
Nation	21 (3.6) 254 (3.3)	69 (4.2) 262 (1.9)	10 (3.3) 278 (6.0)!

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A11a | Teachers' Reports on the Frequency of Mathematics Textbook Use

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Almost Every Day	Several Times a Week	About Once a Week or Less
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL			
State	74 (2.9)	21 (2.8)	5 (1.3)
	272 (1.6)	255 (3.0)	247 (11.6)!
Nation	62 (3.4)	31 (3.1)	7 (1.8)
	267 (1.8)	254 (2.9)	260 (5.1)!
RACE/ETHNICITY			
White			
State	77 (3.1)	19 (3.0)	4 (1.4)
	276 (1.1)	263 (2.4)	270 (7.6)!
Nation	64 (3.7)	28 (3.2)	8 (2.3)
	272 (1.9)	264 (3.4)	264 (5.4)!
Black			
State	53 (8.7)	33 (9.2)	15 (7.5)
	246 (5.7)!	230 (2.7)!	*** (***)
Nation	56 (7.7)	41 (7.9)	2 (1.4)
	244 (4.0)	233 (3.9)!	*** (***)
Hispanic			
State	57 (6.3)	27 (6.4)	16 (3.2)
	*** (***)	*** (***)	*** (***)
Nation	61 (6.8)	32 (5.3)	8 (2.3)
	251 (3.1)	240 (4.3)!	*** (***)
TYPE OF COMMUNITY			
Advantaged urban			
State	68 (7.9)	23 (7.2)	9 (7.1)
	295 (3.5)!	273 (2.8)!	*** (***)
Nation	63 (15.9)	23 (5.2)	14 (14.6)
	283 (7.3)!	*** (***)	*** (***)
Disadvantaged urban			
State	62 (12.2)	21 (10.2)	16 (8.3)
	255 (6.9)!	*** (***)	*** (***)
Nation	66 (10.7)	31 (11.1)	4 (2.2)
	252 (4.7)!	243 (8.0)!	*** (***)
Extreme rural			
State	68 (16.6)	32 (16.3)	1 (0.6)
	274 (4.5)!	*** (***)	*** (***)
Nation	50 (10.6)	40 (10.0)	10 (7.3)
	268 (4.0)!	247 (7.6)!	*** (***)
Other			
State	79 (3.6)	18 (3.6)	3 (1.2)
	271 (1.6)	255 (3.9)!	*** (***)
Nation	63 (3.9)	31 (3.5)	6 (1.9)
	267 (2.3)	255 (3.1)	257 (5.8)!

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A11a
(continued)

Teachers' Reports on the Frequency of Mathematics Textbook Use

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Almost Every Day	Several Times a Week	About Once a Week or Less
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	74 (2.9) 272 (1.6)	21 (2.8) 255 (3.0)	5 (1.3) 247 (11.6)!
Nation	62 (3.4) 267 (1.8)	31 (3.1) 254 (2.9)	7 (1.8) 260 (5.1)!
PARENTS' EDUCATION			
HS non-graduate			
State	67 (5.5) 255 (3.1)	21 (4.2) *** (***)	12 (4.4) *** (***)
Nation	67 (5.5) 245 (3.2)	27 (5.2) *** (***)	6 (2.1) *** (***)
HS graduate			
State	74 (3.4) 261 (1.7)	21 (3.3) 247 (3.5)	5 (1.3) *** (***)
Nation	61 (4.4) 257 (2.5)	34 (3.7) 250 (2.9)	6 (1.5) *** (***)
Some college			
State	74 (3.9) 275 (1.6)	21 (3.9) 260 (3.6)!	5 (1.7) *** (***)
Nation	68 (4.2) 272 (2.7)	26 (3.7) 258 (5.2)	6 (1.9) *** (***)
College graduate			
State	76 (3.4) 287 (2.1)	19 (3.1) 265 (3.2)	5 (1.7) *** (***)
Nation	61 (4.0) 281 (2.2)	31 (3.9) 265 (3.1)	8 (3.1) *** (***)
GENDER			
Male			
State	73 (3.0) 275 (1.9)	21 (2.8) 258 (3.0)	6 (1.5) *** (***)
Nation	60 (3.7) 269 (2.1)	33 (3.4) 256 (3.6)	7 (1.9) 261 (6.7)!
Female			
State	75 (3.2) 269 (1.7)	20 (3.1) 252 (3.4)	5 (1.2) *** (***)
Nation	65 (3.6) 266 (1.8)	28 (3.3) 253 (2.5)	7 (2.2) *** (***)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A11b | Teachers' Reports on the Frequency of Mathematics Worksheet Use

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	At Least Several Times a Week	About Once a Week	Less than Weekly
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	51 (4.0) 262 (2.2)	24 (2.6) 272 (3.0)	25 (3.3) 272 (3.5)
Nation	34 (3.8) 256 (2.3)	33 (3.4) 260 (2.3)	32 (3.6) 274 (2.7)
RACE/ETHNICITY			
White			
State	50 (4.1) 270 (1.3)	26 (2.9) 276 (2.5)	24 (3.1) 276 (2.7)
Nation	32 (4.1) 264 (2.7)	33 (3.5) 264 (2.7)	35 (3.8) 279 (2.9)
Black			
State	60 (10.9) 232 (4.1)!	15 (4.5) *** (***)	25 (9.7) *** (***)
Nation	45 (7.5) 232 (3.1)!	31 (7.6) 243 (2.3)!	23 (6.3) 248 (7.0)!
Hispanic			
State	60 (6.1) *** (***)	22 (3.8) *** (***)	18 (4.4) *** (***)
Nation	41 (7.7) 242 (3.2)!	26 (5.3) 244 (5.1)!	33 (7.5) 257 (2.3)!
TYPE OF COMMUNITY			
Advantaged urban			
State	55 (5.3) 280 (3.1)!	25 (7.0) 294 (5.4)!	19 (5.6) *** (***)
Nation	59 (13.9) 273 (3.4)!	20 (6.0) *** (***)	21 (8.2) *** (***)
Disadvantaged urban			
State	65 (10.4) 236 (6.8)!	14 (5.3) *** (***)	21 (6.2) *** (***)
Nation	50 (13.9) 237 (2.4)!	22 (11.2) 258 (8.3)!	28 (10.7) 263 (4.1)!
Extreme rural			
State	30 (14.4) *** (***)	24 (10.8) *** (***)	46 (9.4) 267 (7.3)!
Nation	27 (14.3) *** (***)	49 (12.7) 258 (6.7)!	24 (10.1) *** (***)
Other			
State	49 (5.3) 265 (1.7)	25 (3.7) 273 (2.7)	26 (4.6) 270 (4.6)!
Nation	30 (4.4) 256 (3.3)	35 (4.3) 259 (2.8)	36 (4.2) 272 (2.9)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A11b (continued)

Teachers' Reports on the Frequency of Mathematics Worksheet Use

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**At Least Several Times a Week**	**About Once a Week**	**Less than Weekly**
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	51 (4.0) 262 (2.2)	24 (2.6) 272 (3.0)	25 (3.3) 272 (3.5)
Nation	34 (3.6) 256 (2.3)	33 (3.4) 260 (2.3)	32 (3.6) 274 (2.7)
PARENTS' EDUCATION			
HS non-graduate			
State	54 (6.9) 245 (5.1)	22 (5.2) *** (***)	23 (6.8) *** (***)
Nation	35 (6.0) 239 (3.5)	29 (6.3) *** (***)	36 (6.9) 250 (4.5)!
HS graduate			
State	51 (4.6) 253 (2.2)	23 (3.2) 259 (3.0)	26 (3.7) 262 (3.7)
Nation	35 (5.3) 250 (3.6)	36 (4.5) 250 (2.7)	30 (4.8) 263 (3.4)
Some college			
State	53 (5.1) 267 (2.9)	22 (3.3) 276 (2.8)	26 (3.8) 275 (3.6)
Nation	33 (4.7) 260 (2.8)	32 (4.0) 266 (4.2)	35 (4.1) 278 (2.6)
College graduate			
State	49 (4.2) 277 (2.6)	28 (3.3) 284 (3.5)	23 (3.5) 288 (4.5)
Nation	35 (3.8) 264 (2.6)	32 (3.4) 271 (2.4)	33 (3.5) 289 (2.9)
GENDER			
Male			
State	50 (3.9) 264 (2.2)	24 (2.6) 275 (3.7)	25 (3.2) 275 (3.3)
Nation	35 (4.1) 257 (3.2)	35 (3.6) 261 (2.8)	31 (3.5) 275 (3.2)
Female			
State	52 (4.4) 260 (2.5)	24 (3.0) 269 (3.2)	24 (3.5) 268 (4.2)
Nation	34 (4.1) 254 (2.1)	32 (3.7) 258 (2.3)	34 (4.1) 273 (2.8)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A12 | Students' Reports on the Frequency of Small Group Work

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	At Least Once a Week	Less Than Once a Week	Never
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL			
State	17 (1.4) 263 (2.6)	25 (1.5) 272 (1.9)	58 (2.2) 266 (1.9)
Nation	28 (2.5) 258 (2.7)	28 (1.4) 267 (2.0)	44 (2.9) 261 (1.6)
RACE/ETHNICITY			
White			
State	16 (1.5) 272 (2.5)	26 (1.6) 275 (1.6)	58 (2.5) 271 (1.3)
Nation	27 (2.9) 268 (3.1)	29 (1.7) 272 (1.9)	44 (3.5) 270 (1.7)
Black			
State	16 (2.3) *** (***)	21 (4.0) *** (***)	63 (4.0) 238 (4.6)
Nation	28 (3.0) 234 (3.0)	24 (3.6) 245 (4.6)	48 (4.7) 234 (3.1)
Hispanic			
State	31 (4.0) *** (***)	23 (4.1) *** (***)	46 (5.3) *** (***)
Nation	37 (5.2) 242 (3.9)	22 (3.6) 250 (3.4)	41 (5.0) 240 (2.8)
TYPE OF COMMUNITY			
Advantaged urban			
State	23 (5.6) 291 (7.2)	30 (4.1) 289 (4.8)!	47 (5.2) 287 (3.2)!
Nation	27 (13.9) *** (***)	33 (4.5) 286 (5.4)!	40 (13.4) 279 (3.5)!
Disadvantaged urban			
State	20 (4.0) *** (***)	27 (4.2) 259 (6.7)!	53 (4.8) 243 (6.8)!
Nation	31 (5.7) 245 (4.0)!	20 (2.8) 267 (6.4)!	49 (6.3) 245 (3.7)!
Extreme rural			
State	25 (7.2) *** (***)	22 (3.9) *** (***)	53 (8.2) 267 (6.3)!
Nation	34 (10.8) 249 (5.2)!	27 (3.8) 264 (3.5)!	39 (11.6) 256 (6.2)!
Other			
State	14 (1.7) 265 (2.5)	24 (2.0) 270 (2.2)	61 (3.2) 268 (1.8)
Nation	27 (2.6) 260 (3.3)	28 (1.7) 264 (2.1)	45 (3.3) 262 (2.2)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A12 (continued) | Students' Reports on the Frequency of Small Group Work

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	At Least Once a Week	Less Than Once a Week	Never
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL			
State	17 (1.4) 263 (2.6)	25 (1.5) 272 (1.9)	58 (2.2) 266 (1.9)
Nation	28 (2.5) 256 (2.7)	28 (1.4) 267 (2.0)	44 (2.9) 261 (1.6)
PARENTS' EDUCATION			
HS non-graduate			
State	20 (4.0) *** (***)	19 (3.2) *** (***)	62 (3.8) 250 (3.5)
Nation	29 (4.5) 242 (3.4)	29 (3.0) 244 (3.0)	42 (4.5) 242 (2.7)
HS graduate			
State	16 (1.7) 253 (2.8)	26 (2.0) 261 (2.3)	58 (2.5) 256 (2.0)
Nation	28 (3.0) 251 (3.7)	28 (1.6) 261 (2.6)	43 (3.4) 252 (1.7)
Some college			
State	16 (2.2) 268 (3.8)	26 (2.9) 273 (3.5)	58 (3.4) 271 (2.0)
Nation	27 (3.9) 265 (3.6)	27 (2.4) 268 (3.3)	46 (3.8) 266 (2.1)
College graduate			
State	17 (2.0) 279 (3.6)	26 (1.7) 286 (2.7)	57 (2.6) 280 (2.1)
Nation	28 (3.0) 270 (2.7)	28 (1.9) 278 (2.8)	44 (3.6) 275 (2.2)
GENDER			
Male			
State	18 (1.5) 264 (2.9)	25 (1.9) 274 (2.5)	57 (2.5) 269 (2.1)
Nation	31 (2.9) 259 (3.3)	28 (1.7) 268 (2.6)	41 (2.9) 262 (1.8)
Female			
State	16 (1.5) 262 (3.4)	25 (1.8) 269 (2.4)	59 (2.5) 262 (2.0)
Nation	26 (2.4) 257 (2.8)	27 (1.8) 266 (1.7)	47 (3.2) 260 (1.8)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A13 | Students' Reports on the Use of Mathematics Objects

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	At Least Once a Week	Less Than Once a Week	Never
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	17 (1.5) 264 (2.4)	29 (1.2) 268 (1.6)	54 (1.9) 266 (2.1)
Nation	28 (1.8) 258 (2.6)	31 (1.2) 269 (1.5)	41 (2.2) 259 (1.6)
RACE/ETHNICITY			
White			
State	17 (1.6) 269 (2.3)	31 (1.3) 272 (1.4)	52 (2.1) 274 (1.2)
Nation	27 (1.9) 266 (2.6)	33 (1.6) 275 (1.6)	40 (2.5) 268 (1.8)
Black			
State	15 (2.7) *** (***)	21 (2.6) *** (***)	64 (4.3) 238 (4.5)!
Nation	27 (3.3) 234 (3.7)	27 (3.2) 248 (4.5)	46 (4.5) 232 (2.6)
Hispanic			
State	22 (4.9) *** (***)	22 (4.0) *** (***)	57 (5.7) *** (***)
Nation	38 (4.2) 241 (4.6)	23 (2.0) 253 (4.3)	40 (4.0) 240 (1.9)
TYPE OF COMMUNITY			
Advantaged urban			
State	22 (3.4) 290 (4.3)!	34 (2.6) 289 (3.7)!	44 (4.3) 288 (2.9)!
Nation	36 (10.3) 278 (6.1)!	33 (4.8) 284 (3.2)!	32 (11.1) 281 (5.9)!
Disadvantaged urban			
State	16 (5.7) *** (***)	20 (2.0) *** (***)	64 (6.0) 245 (7.9)!
Nation	35 (6.6) 249 (5.3)!	19 (2.1) 256 (5.7)!	46 (6.4) 246 (4.8)!
Extreme rural			
State	13 (4.9) *** (***)	34 (6.6) 266 (5.4)!	53 (9.5) 270 (3.6)!
Nation	21 (3.1) *** (***)	37 (4.7) 262 (4.7)!	43 (5.0) 251 (5.2)!
Other			
State	18 (2.0) 262 (3.0)	30 (1.6) 268 (1.8)	52 (2.4) 269 (1.7)
Nation	27 (2.0) 256 (2.9)	31 (1.4) 270 (1.8)	41 (2.4) 260 (2.2)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A13
(continued)

Students' Reports on the Use of Mathematics Objects

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	At Least Once a Week	Less Than Once a Week	Never
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL			
State	17 (1.5) 264 (2.4)	29 (1.2) 268 (1.6)	54 (1.9) 266 (2.1)
Nation	28 (1.8) 258 (2.6)	31 (1.2) 269 (1.5)	41 (2.2) 259 (1.6)
PARENTS' EDUCATION			
HS non-graduate			
State	14 (3.1) *** (***)	36 (4.3) *** (***)	50 (5.2) 247 (5.9)
Nation	27 (4.2) 237 (3.0)	26 (2.7) 253 (3.5)	47 (5.0) 240 (2.3)
HS graduate			
State	17 (1.9) 255 (2.9)	28 (1.6) 258 (2.0)	55 (2.4) 256 (2.1)
Nation	27 (2.7) 250 (2.4)	31 (2.4) 259 (2.7)	43 (3.3) 253 (2.1)
Some college			
State	17 (2.1) 264 (3.0)	30 (2.1) 272 (2.1)	53 (2.6) 272 (2.4)
Nation	29 (2.6) 261 (3.5)	36 (2.3) 274 (2.2)	35 (2.6) 263 (2.1)
College graduate			
State	18 (1.9) 280 (3.5)	29 (1.6) 282 (2.2)	53 (2.3) 281 (2.3)
Nation	30 (2.5) 269 (3.0)	32 (2.0) 278 (2.0)	38 (2.6) 275 (2.0)
GENDER			
Male			
State	20 (1.7) 267 (2.6)	28 (1.3) 271 (2.0)	53 (2.0) 269 (2.2)
Nation	32 (2.0) 258 (2.9)	30 (1.5) 271 (2.1)	38 (2.2) 260 (1.8)
Female			
State	15 (1.6) 261 (3.0)	30 (1.6) 265 (1.8)	55 (2.2) 264 (2.4)
Nation	25 (2.0) 257 (3.0)	31 (1.9) 268 (1.5)	44 (2.6) 257 (1.9)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A14 | Students' Reports on the Frequency of Mathematics Textbook Use

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Almost Every Day**	**Several Times a Week**	**About Once a Week or Less**
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	75 (1.7)	17 (1.0)	9 (0.9)
	270 (1.5)	256 (2.3)	256 (4.6)
Nation	74 (1.9)	14 (0.8)	12 (1.8)
	267 (1.2)	252 (1.7)	242 (4.5)
RACE/ETHNICITY			
White			
State	77 (1.9)	15 (1.2)	8 (1.1)
	275 (1.0)	264 (1.9)	266 (3.5)
Nation	76 (2.5)	13 (0.8)	11 (2.2)
	274 (1.3)	258 (2.2)	252 (5.1)!
Black			
State	64 (6.8)	22 (4.4)	14 (3.5)
	243 (4.6)	*** (***)	*** (***)
Nation	71 (2.8)	15 (1.7)	14 (3.2)
	240 (2.9)	232 (3.1)	223 (6.1)!
Hispanic			
State	60 (4.8)	23 (3.7)	17 (3.2)
	230 (3.8)	*** (***)	*** (***)
Nation	61 (3.7)	21 (2.9)	17 (2.7)
	249 (2.3)	242 (5.1)	224 (3.4)
TYPE OF COMMUNITY			
Advantaged urban			
State	71 (5.8)	17 (2.5)	11 (4.6)
	293 (2.7)	*** (***)	*** (***)
Nation	73 (11.1)	13 (1.7)	14 (10.4)
	286 (4.6)!	*** (***)	*** (***)
Disadvantaged urban			
State	69 (5.5)	21 (3.3)	10 (2.6)
	251 (6.9)!	*** (***)	*** (***)
Nation	69 (2.8)	15 (2.5)	15 (2.2)
	253 (3.7)!	243 (4.4)!	235 (6.5)!
Extreme rural			
State	85 (2.4)	11 (2.0)	4 (1.2)
	269 (3.0)!	*** (***)	*** (***)
Nation	68 (11.3)	15 (3.6)	17 (8.2)
	263 (4.2)!	*** (***)	*** (***)
Other			
State	77 (2.1)	15 (1.4)	8 (1.3)
	270 (1.6)	259 (1.8)	263 (4.9)
Nation	75 (2.2)	14 (1.0)	10 (1.9)
	267 (1.6)	252 (2.6)	239 (4.3)!

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A14 (continued) | Students' Reports on the Frequency of Mathematics Textbook Use

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Almost Every Day	Several Times a Week	About Once a Week or Less
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL			
State	75 (1.7)	17 (1.0)	9 (0.9)
	270 (1.5)	256 (2.3)	256 (4.6)
Nation	74 (1.9)	14 (0.8)	12 (1.8)
	267 (1.2)	252 (1.7)	242 (4.5)
PARENTS' EDUCATION			
HS non-graduate			
State	62 (5.4)	28 (4.5)	11 (3.0)
	253 (3.6)	*** (***)	*** (***)
Nation	64 (3.4)	18 (2.0)	18 (3.1)
	245 (2.3)	*** (***)	*** (***)
HS graduate			
State	75 (2.2)	15 (1.4)	10 (1.3)
	259 (1.5)	249 (2.5)	247 (4.3)
Nation	71 (3.6)	16 (1.8)	13 (2.8)
	258 (1.6)	249 (3.2)	239 (3.4)!
Some college			
State	74 (2.4)	18 (2.0)	8 (1.1)
	274 (1.6)	261 (3.5)	*** (***)
Nation	80 (2.0)	11 (1.2)	9 (1.7)
	270 (1.9)	*** (***)	*** (***)
College graduate			
State	78 (2.1)	14 (1.4)	8 (1.3)
	284 (1.9)	270 (4.6)	268 (5.5)
Nation	77 (2.7)	13 (0.9)	10 (2.3)
	279 (1.6)	260 (2.8)	257 (6.4)!
GENDER			
Male			
State	74 (1.8)	17 (1.4)	9 (0.9)
	273 (1.6)	260 (3.0)	258 (4.1)
Nation	72 (2.4)	16 (1.2)	12 (2.1)
	268 (1.6)	252 (2.5)	242 (6.1)
Female			
State	75 (1.9)	16 (1.2)	9 (1.1)
	267 (1.9)	252 (2.4)	254 (5.6)
Nation	76 (1.8)	13 (1.0)	11 (1.6)
	265 (1.3)	250 (2.5)	242 (3.8)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A15 | Students' Reports on the Frequency of Mathematics Worksheet Use

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	At Least Several Times a Week	About Once a Week	Less Than Weekly
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	42 (2.4)	22 (1.4)	35 (2.4)
	261 (1.8)	268 (2.4)	271 (2.4)
Nation	38 (2.4)	25 (1.2)	37 (2.5)
	253 (2.2)	261 (1.4)	272 (1.9)
RACE/ETHNICITY			
White			
State	41 (2.5)	23 (1.6)	35 (2.4)
	269 (1.3)	273 (1.7)	276 (1.7)
Nation	35 (2.9)	24 (1.3)	41 (3.0)
	262 (2.5)	269 (1.5)	277 (2.0)
Black			
State	45 (6.5)	17 (2.8)	38 (7.4)
	231 (3.3)!	*** (***)	248 (5.2)!
Nation	48 (3.8)	32 (2.7)	20 (3.1)
	232 (4.3)	241 (2.9)	241 (4.4)
Hispanic			
State	53 (5.1)	21 (5.5)	25 (5.4)
	*** (***)	*** (***)	*** (***)
Nation	44 (4.1)	25 (3.4)	32 (4.3)
	238 (3.9)	247 (3.3)	248 (3.3)
TYPE OF COMMUNITY			
Advantaged urban			
State	52 (5.7)	18 (3.8)	30 (4.7)
	282 (2.1)!	*** (***)	297 (4.6)!
Nation	50 (9.0)	19 (4.9)	31 (9.3)
	271 (3.3)!	*** (***)	299 (5.3)!
Disadvantaged urban			
State	45 (7.0)	20 (3.7)	35 (7.0)
	230 (4.3)!	*** (***)	258 (5.7)!
Nation	37 (5.8)	23 (3.6)	41 (6.7)
	240 (4.8)!	253 (4.1)!	255 (4.2)!
Extreme rural			
State	35 (7.7)	26 (3.3)	39 (7.1)
	266 (5.6)!	*** (***)	269 (7.7)!
Nation	42 (10.1)	30 (4.4)	28 (7.5)
	249 (4.0)!	256 (3.4)!	267 (7.3)!
Other			
State	41 (2.8)	23 (1.8)	36 (3.2)
	263 (1.9)	269 (1.8)	272 (2.6)
Nation	36 (2.9)	26 (1.2)	38 (2.9)
	252 (3.0)	261 (2.1)	272 (1.8)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A15 (continued) | Students' Reports on the Frequency of Mathematics Worksheet Use

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	At Least Several Times a Week	About Once a Week	Less Than Weekly
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL			
State	42 (2.4) 261 (1.8)	22 (1.4) 268 (2.4)	35 (2.4) 271 (2.4)
Nation	38 (2.4) 253 (2.2)	25 (1.2) 261 (1.4)	37 (2.5) 272 (1.9)
PARENTS' EDUCATION			
HS non-graduate			
State	50 (4.0) 242 (2.6)	18 (3.5) *** (***)	32 (4.3) *** (***)
Nation	41 (4.5) 235 (3.1)	30 (2.7) 243 (2.7)	29 (4.0) 253 (2.8)
HS graduate			
State	39 (2.9) 252 (1.7)	23 (1.8) 257 (2.8)	38 (3.0) 261 (2.4)
Nation	40 (3.2) 247 (2.7)	29 (2.2) 256 (2.5)	32 (3.6) 262 (2.2)
Some college			
State	41 (3.3) 264 (2.6)	24 (2.4) 274 (2.8)	36 (3.1) 276 (2.4)
Nation	34 (3.4) 259 (2.3)	26 (2.2) 269 (2.8)	40 (3.6) 271 (2.8)
College graduate			
State	43 (2.7) 276 (2.6)	22 (2.0) 284 (2.4)	35 (2.9) 285 (2.9)
Nation	38 (2.8) 264 (2.6)	22 (1.8) 273 (2.5)	41 (2.6) 285 (2.3)
GENDER			
Male			
State	42 (2.7) 264 (1.9)	22 (1.9) 272 (2.6)	36 (2.9) 274 (2.8)
Nation	39 (2.7) 253 (2.7)	25 (1.6) 263 (2.3)	35 (2.7) 274 (2.4)
Female			
State	42 (2.5) 259 (2.2)	23 (1.6) 265 (2.8)	35 (2.3) 268 (2.6)
Nation	37 (2.5) 253 (2.1)	25 (1.5) 259 (1.8)	38 (2.6) 269 (2.2)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A18 | Students' Reports on Whether They Own a Calculator and Whether Their Teacher Explains How to Use One

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Own a Calculator		Teacher Explains Calculator Use	
	Yes	No	Yes	No
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL				
State	97 (0.4) 267 (1.6)	3 (0.4) 234 (4.2)	38 (1.9) 260 (1.8)	62 (1.9) 271 (1.7)
Nation	97 (0.4) 263 (1.3)	3 (0.4) 234 (3.8)	49 (2.3) 258 (1.7)	51 (2.3) 266 (1.5)
RACE/ETHNICITY				
White				
State	98 (0.3) 273 (1.0)	2 (0.3) *** (***)	36 (2.0) 266 (1.2)	64 (2.0) 276 (1.3)
Nation	98 (0.3) 270 (1.5)	2 (0.3) *** (***)	46 (2.6) 266 (1.8)	54 (2.6) 273 (1.8)
Black				
State	91 (2.2) 240 (3.4)	9 (2.2) *** (***)	43 (4.0) 234 (3.7)!	57 (4.0) 242 (4.1)!
Nation	93 (1.5) 237 (2.8)	7 (1.5) *** (***)	53 (4.9) 235 (3.6)	47 (4.9) 239 (2.7)
Hispanic				
State	91 (2.0) 232 (4.0)	9 (2.0) *** (***)	48 (7.3) *** (***)	52 (7.3) *** (***)
Nation	92 (1.2) 245 (2.7)	8 (1.2) *** (***)	63 (4.3) 243 (3.4)	37 (4.3) 245 (2.9)
TYPE OF COMMUNITY				
Advantaged urban				
State	99 (0.9) 289 (2.8)!	1 (0.9) *** (***)	46 (5.0) 280 (2.5)!	54 (5.0) 295 (2.8)!
Nation	99 (1.0) 281 (3.8)!	1 (1.0) *** (***)	45 (12.2) 276 (2.5)!	55 (12.2) 285 (6.4)!
Disadvantaged urban				
State	91 (2.0) 247 (6.3)!	9 (2.0) *** (***)	46 (4.8) 240 (5.8)!	54 (4.8) 250 (7.4)!
Nation	94 (1.2) 250 (3.5)!	6 (1.2) *** (***)	53 (7.5) 247 (4.1)!	47 (7.5) 251 (3.6)!
Extreme rural				
State	98 (0.7) 268 (2.8)!	2 (0.7) *** (***)	26 (6.5) *** (***)	74 (6.5) 274 (3.9)!
Nation	96 (1.3) 257 (3.9)!	4 (1.3) *** (***)	42 (8.7) 251 (4.8)!	58 (8.7) 261 (4.4)!
Other				
State	98 (0.3) 268 (1.4)	2 (0.3) *** (***)	35 (2.4) 262 (1.7)	65 (2.4) 271 (1.8)
Nation	97 (0.5) 263 (1.7)	3 (0.5) 233 (5.4)	50 (2.7) 258 (2.1)	50 (2.7) 266 (2.0)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A18
(continued)

Students' Reports on Whether They Own a Calculator and Whether Their Teacher Explains How To Use One

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Own a Calculator		Teacher Explains Calculator Use	
	Yes	No	Yes	No
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL				
State	97 (0.4) 267 (1.6)	3 (0.4) 234 (4.2)	38 (1.9) 260 (1.8)	62 (1.9) 271 (1.7)
Nation	97 (0.4) 263 (1.3)	3 (0.4) 234 (3.8)	49 (2.3) 258 (1.7)	51 (2.3) 266 (1.5)
PARENTS' EDUCATION				
HS non-graduate				
State	89 (2.4) 249 (2.6)	11 (2.4) *** (***)	35 (3.6) *** (***)	65 (3.6) 252 (3.0)
Nation	92 (1.6) 243 (2.0)	8 (1.6) *** (***)	53 (4.6) 242 (2.9)	47 (4.6) 243 (2.5)
HS graduate				
State	96 (0.7) 257 (1.4)	4 (0.7) *** (***)	39 (2.7) 250 (2.3)	61 (2.7) 261 (1.6)
Nation	97 (0.6) 255 (1.5)	3 (0.6) *** (***)	54 (3.0) 252 (1.9)	46 (3.0) 258 (2.0)
Some college				
State	98 (0.6) 271 (1.5)	2 (0.6) *** (***)	41 (2.7) 267 (2.0)	59 (2.7) 273 (1.9)
Nation	96 (0.9) 268 (1.8)	4 (0.9) *** (***)	48 (3.2) 265 (2.4)	52 (3.2) 268 (2.2)
College graduate				
State	99 (0.3) 281 (1.9)	1 (0.3) *** (***)	35 (2.5) 274 (2.3)	65 (2.5) 285 (2.1)
Nation	99 (0.2) 275 (1.6)	1 (0.2) *** (***)	46 (2.6) 268 (2.2)	54 (2.6) 280 (1.9)
GENDER				
Male				
State	97 (0.6) 270 (1.7)	3 (0.6) *** (***)	39 (2.2) 263 (1.9)	61 (2.2) 274 (1.9)
Nation	97 (0.5) 264 (1.7)	3 (0.5) *** (***)	51 (2.6) 258 (2.1)	49 (2.6) 269 (2.1)
Female				
State	97 (0.6) 265 (1.7)	3 (0.6) *** (***)	37 (2.0) 257 (2.1)	63 (2.0) 268 (2.0)
Nation	97 (0.5) 262 (1.3)	3 (0.5) *** (***)	47 (2.5) 258 (1.7)	53 (2.5) 263 (1.6)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A19 | Students' Reports on the Use of a Calculator for Problem Solving or Tests

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Working Problems in Class		Doing Problems at Home		Taking Quizzes or Tests	
	Almost Always	Never	Almost Always	Never	Almost Always	Never
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL						
State	41 (1.4)	36 (1.6)	28 (1.1)	20 (1.0)	16 (1.0)	43 (1.6)
	254 (1.8)	279 (1.6)	260 (1.6)	277 (2.1)	250 (2.5)	279 (1.6)
Nation	48 (1.5)	23 (1.9)	30 (1.3)	19 (0.9)	27 (1.4)	30 (2.0)
	254 (1.5)	272 (1.4)	261 (1.8)	263 (1.8)	253 (2.4)	274 (1.3)
RACE/ETHNICITY						
White						
State	39 (1.5)	38 (1.7)	28 (1.3)	20 (1.0)	16 (1.1)	45 (1.6)
	261 (1.2)	282 (1.3)	265 (1.3)	261 (1.9)	258 (2.0)	282 (1.1)
Nation	46 (1.7)	24 (2.2)	31 (1.5)	18 (1.2)	25 (1.6)	32 (2.3)
	262 (1.7)	278 (1.3)	270 (1.7)	269 (2.3)	263 (2.6)	279 (1.2)
Black						
State	48 (3.8)	29 (3.9)	29 (2.1)	19 (2.9)	25 (3.3)	34 (5.6)
	229 (3.1)!	254 (5.6)!	236 (3.3)!	*** (***)	230 (3.5)!	250 (7.2)!
Nation	57 (3.2)	20 (3.9)	31 (2.9)	18 (1.9)	38 (3.3)	24 (3.1)
	232 (2.4)	249 (4.0)	233 (3.3)	248 (5.5)	230 (3.6)	251 (4.1)
Hispanic						
State	57 (4.5)	17 (3.5)	31 (6.1)	14 (4.1)	37 (3.9)	22 (3.3)
	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Nation	51 (2.9)	16 (3.5)	26 (3.2)	21 (2.1)	26 (2.7)	22 (3.1)
	239 (2.8)	252 (3.3)!	238 (4.8)	244 (3.1)	237 (3.2)	256 (4.2)
TYPE OF COMMUNITY						
Advantaged urban						
State	36 (5.0)	32 (4.1)	34 (3.4)	16 (3.1)	15 (2.2)	40 (4.6)
	277 (2.9)!	298 (3.5)!	278 (2.8)!	*** (***)	*** (***)	297 (3.3)!
Nation	51 (5.4)	23 (10.7)	32 (6.1)	15 (2.4)	31 (3.8)	28 (9.8)
	270 (4.7)!	*** (***)	274 (4.9)!	*** (***)	281 (7.6)!	285 (4.2)!
Disadvantaged urban						
State	54 (4.0)	24 (4.2)	34 (2.8)	14 (2.8)	24 (3.6)	27 (4.2)
	236 (5.4)!	255 (7.1)!	240 (5.3)!	*** (***)	227 (3.7)!	257 (7.4)!
Nation	52 (3.1)	22 (4.5)	30 (3.3)	24 (2.3)	27 (2.9)	27 (4.8)
	241 (3.8)!	259 (5.4)!	246 (5.2)!	254 (4.6)!	240 (4.9)!	263 (5.0)!
Extreme rural						
State	38 (3.2)	44 (6.7)	18 (2.1)	20 (1.7)	20 (4.3)	50 (4.4)
	257 (2.8)!	279 (2.7)!	*** (***)	*** (***)	*** (***)	278 (3.2)!
Nation	46 (7.4)	29 (6.5)	20 (2.5)	23 (3.9)	24 (6.6)	37 (8.3)
	246 (4.3)!	268 (6.1)!	*** (***)	263 (4.4)!	*** (***)	270 (4.0)!
Other						
State	40 (1.5)	39 (1.7)	27 (1.3)	21 (1.2)	18 (1.4)	46 (1.6)
	256 (1.6)	280 (1.7)	261 (1.6)	278 (2.0)	252 (2.8)	280 (1.4)
Nation	48 (1.9)	22 (2.0)	32 (1.7)	18 (1.1)	27 (1.8)	29 (2.1)
	254 (2.1)	272 (1.8)	263 (2.3)	263 (2.8)	253 (2.7)	275 (1.9)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. The percentages may not total 100 percent because the "Sometimes" category is not included. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A19 (continued) | Students' Reports on the Use of a Calculator for Problem Solving or Tests

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Working Problems in Class		Doing Problems at Home		Taking Quizzes or Tests	
	Almost Always	Never	Almost Always	Never	Almost Always	Never
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL						
State	41 (1.4) 254 (1.8)	36 (1.6) 279 (1.6)	28 (1.1) 260 (1.6)	20 (1.0) 277 (2.1)	18 (1.0) 250 (2.5)	43 (1.6) 279 (1.6)
Nation	48 (1.5) 254 (1.5)	23 (1.9) 272 (1.4)	30 (1.3) 261 (1.8)	19 (0.9) 263 (1.8)	27 (1.4) 253 (2.4)	30 (2.0) 274 (1.3)
PARENTS' EDUCATION						
HS non-graduate						
State	52 (3.9) 244 (3.8)	19 (2.8) *** (***)	29 (3.8) *** (***)	15 (3.0) *** (***)	24 (2.5) *** (***)	29 (4.0) *** (***)
Nation	54 (3.3) 240 (2.3)	19 (3.8) *** (***)	26 (3.1) 244 (3.8)	22 (2.6) 244 (4.2)	32 (3.6) 237 (2.3)	24 (3.2) 251 (4.6)
HS graduate						
State	47 (1.7) 248 (1.7)	32 (2.1) 269 (1.8)	28 (1.6) 252 (1.7)	18 (1.4) 265 (2.5)	19 (1.4) 242 (2.6)	39 (2.1) 269 (1.8)
Nation	52 (2.5) 249 (1.4)	20 (2.4) 265 (2.7)	29 (1.9) 250 (2.4)	18 (1.5) 256 (2.4)	26 (1.8) 246 (2.8)	27 (2.2) 265 (2.0)
Some college						
State	38 (2.5) 258 (2.4)	41 (2.9) 279 (1.9)	28 (2.1) 262 (2.3)	19 (1.7) 279 (3.1)	17 (1.6) 255 (3.1)	45 (2.7) 281 (1.6)
Nation	46 (2.8) 258 (2.1)	26 (2.8) 272 (2.5)	28 (2.0) 267 (3.0)	20 (1.9) 268 (3.2)	26 (2.4) 255 (3.6)	35 (2.5) 275 (2.0)
College graduate						
State	35 (2.1) 267 (2.5)	41 (2.2) 291 (1.7)	27 (1.6) 271 (3.1)	21 (1.5) 291 (2.3)	16 (1.9) 265 (3.7)	49 (2.5) 290 (1.7)
Nation	45 (1.9) 265 (1.7)	25 (2.4) 284 (1.8)	33 (2.0) 274 (2.2)	16 (1.4) 278 (2.8)	26 (1.6) 268 (2.6)	33 (2.7) 285 (2.0)
GENDER						
Male						
State	44 (1.6) 258 (1.7)	34 (1.7) 284 (1.9)	28 (1.2) 262 (2.0)	21 (1.2) 279 (2.4)	16 (1.3) 253 (2.7)	39 (1.7) 284 (2.0)
Nation	50 (1.7) 255 (1.9)	20 (2.0) 275 (2.2)	29 (1.6) 264 (2.8)	19 (1.3) 263 (2.5)	27 (1.5) 256 (3.0)	26 (2.1) 277 (1.9)
Female						
State	39 (1.7) 250 (2.3)	37 (2.0) 275 (1.8)	28 (1.7) 257 (2.1)	18 (1.3) 274 (3.0)	20 (1.3) 248 (3.2)	47 (2.0) 275 (1.8)
Nation	46 (2.0) 252 (1.7)	26 (2.1) 269 (1.8)	32 (1.6) 259 (1.7)	18 (1.2) 263 (2.1)	27 (1.8) 251 (2.4)	33 (2.1) 271 (1.5)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. The percentages may not total 100 percent because the "Sometimes" category is not included. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A20 | Students' Knowledge of Using Calculators

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	High "Calculator-Use" Group	Other "Calculator-Use" Group
	Percentage and Proficiency	**Percentage and Proficiency**
TOTAL		
State	47 (1.2) 274 (1.9)	53 (1.2) 260 (1.7)
Nation	42 (1.3) 272 (1.6)	58 (1.3) 255 (1.5)
RACE/ETHNICITY		
White		
State	48 (1.2) 279 (1.4)	52 (1.2) 266 (1.3)
Nation	44 (1.4) 277 (1.7)	56 (1.4) 263 (1.7)
Black		
State	39 (3.7) 244 (5.9)!	61 (3.7) 234 (2.5)!
Nation	37 (3.4) 248 (3.9)	63 (3.4) 231 (3.0)
Hispanic		
State	42 (6.4) *** (***)	58 (6.4) *** (***)
Nation	36 (4.2) 254 (4.6)	64 (4.2) 238 (3.0)
TYPE OF COMMUNITY		
Advantaged urban		
State	55 (2.3) 293 (4.1)!	45 (2.3) 281 (2.8)!
Nation	50 (3.8) 288 (4.9)!	50 (3.8) 275 (4.4)!
Disadvantaged urban		
State	40 (3.6) 251 (6.5)!	60 (3.6) 241 (6.2)!
Nation	38 (4.2) 262 (5.6)!	62 (4.2) 244 (3.9)!
Extreme rural		
State	46 (3.6) *** (***)	54 (3.6) 267 (3.8)!
Nation	39 (5.6) 269 (4.4)!	61 (5.6) 248 (4.3)!
Other		
State	47 (1.6) 274 (1.6)	53 (1.6) 261 (1.9)
Nation	42 (1.4) 271 (1.9)	58 (1.4) 255 (2.0)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A20 (continued) | Students' Knowledge of Using Calculators

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	High "Calculator-Use" Group	Other "Calculator-Use" Group
	Percentage and Proficiency	**Percentage and Proficiency**
TOTAL		
State	47 (1.2) 274 (1.9)	53 (1.2) 260 (1.7)
Nation	42 (1.3) 272 (1.6)	58 (1.3) 255 (1.5)
PARENTS' EDUCATION		
HS non-graduate		
State	38 (5.3) *** (***)	62 (5.3) 247 (4.3)
Nation	34 (3.3) 248 (4.4)	66 (3.3) 242 (2.4)
HS graduate		
State	46 (2.3) 263 (2.0)	54 (2.3) 250 (2.2)
Nation	40 (2.2) 263 (2.0)	60 (2.2) 249 (1.8)
Some college		
State	45 (2.1) 276 (2.3)	55 (2.1) 266 (2.2)
Nation	48 (2.2) 277 (2.6)	52 (2.2) 258 (2.5)
College graduate		
State	51 (1.9) 288 (2.5)	49 (1.9) 274 (2.3)
Nation	46 (2.0) 282 (2.1)	54 (2.0) 268 (1.9)
GENDER		
Male		
State	46 (1.2) 277 (2.3)	54 (1.2) 262 (2.0)
Nation	39 (2.0) 274 (2.0)	61 (2.0) 255 (2.3)
Female		
State	48 (1.9) 270 (2.1)	52 (1.9) 257 (2.2)
Nation	45 (1.8) 269 (1.7)	55 (1.8) 254 (1.3)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A24 | Students' Reports on Types of Reading Materials in the Home

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Zero to Two Types	Three Types	Four Types
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL			
State	14 (0.7) 249 (2.5)	30 (1.2) 262 (1.8)	56 (1.4) 273 (1.6)
Nation	21 (1.0) 244 (2.0)	30 (1.0) 256 (1.7)	48 (1.3) 272 (1.5)
RACE/ETHNICITY			
White			
State	12 (0.7) 258 (2.2)	29 (1.4) 267 (1.3)	59 (1.4) 278 (1.2)
Nation	16 (1.1) 251 (2.2)	29 (1.3) 268 (1.5)	56 (1.5) 276 (1.7)
Black			
State	23 (3.2) *** (***)	34 (3.2) 236 (3.5)!	42 (3.6) 244 (3.7)
Nation	31 (1.9) 232 (3.2)	36 (2.2) 233 (3.9)	33 (2.4) 245 (3.3)
Hispanic			
State	32 (4.6) *** (***)	27 (3.4) *** (***)	40 (4.1) *** (***)
Nation	44 (3.0) 237 (3.4)	30 (2.4) 244 (4.3)	26 (2.3) 253 (2.4)
TYPE OF COMMUNITY			
Advantaged urban			
State	8 (1.2) *** (***)	21 (2.7) 285 (4.0)!	71 (3.0) 291 (3.0)
Nation	13 (3.8) *** (***)	26 (2.1) *** (***)	61 (4.9) 287 (3.6)!
Disadvantaged urban			
State	25 (2.0) 229 (5.1)!	35 (2.1) 243 (6.0)!	40 (2.7) 255 (7.9)!
Nation	32 (3.9) 243 (2.9)!	31 (2.3) 247 (3.7)!	37 (3.6) 257 (4.9)!
Extreme rural			
State	16 (2.7) *** (***)	29 (4.2) *** (***)	55 (3.1) 274 (3.0)!
Nation	17 (4.9) *** (***)	33 (3.2) 253 (4.3)!	50 (5.1) 263 (5.6)!
Other			
State	13 (0.9) 254 (2.7)	30 (1.7) 263 (1.7)	56 (1.6) 273 (1.7)
Nation	22 (1.5) 244 (2.6)	30 (1.3) 259 (2.2)	48 (1.5) 272 (1.7)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A24
(continued)

Students' Reports on Types of Reading Materials in the Home

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Zero to Two Types	Three Types	Four Types
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	14 (0.7) 249 (2.5)	30 (1.2) 262 (1.8)	56 (1.4) 273 (1.6)
Nation	21 (1.0) 244 (2.0)	30 (1.0) 258 (1.7)	48 (1.3) 272 (1.5)
PARENTS' EDUCATION			
HS non-graduate			
State	35 (4.5) *** (***)	33 (4.0) *** (***)	33 (3.4) *** (***)
Nation	47 (4.0) 240 (3.4)	28 (3.0) 243 (3.3)	25 (2.8) 246 (3.3)
HS graduate			
State	19 (1.3) 247 (3.2)	35 (1.8) 255 (1.9)	46 (1.7) 261 (1.7)
Nation	26 (2.2) 246 (2.2)	33 (1.9) 253 (2.7)	40 (1.7) 260 (2.1)
Some college			
State	10 (1.3) *** (***)	29 (2.1) 267 (2.5)	61 (2.6) 274 (1.8)
Nation	17 (1.5) 251 (4.0)	32 (1.7) 262 (2.6)	51 (2.0) 274 (1.9)
College graduate			
State	6 (0.8) *** (***)	25 (1.8) 275 (3.1)	69 (1.9) 284 (1.9)
Nation	10 (0.8) 254 (2.8)	28 (1.8) 269 (2.5)	62 (2.0) 280 (1.8)
GENDER			
Male			
State	13 (1.1) 250 (3.2)	30 (1.4) 263 (1.9)	57 (1.6) 277 (1.9)
Nation	21 (1.5) 244 (2.3)	31 (1.5) 259 (2.1)	48 (1.4) 273 (2.0)
Female			
State	16 (1.0) 247 (2.9)	30 (1.8) 261 (2.3)	54 (1.8) 270 (1.8)
Nation	22 (1.2) 244 (2.2)	29 (1.4) 258 (1.9)	49 (1.9) 270 (1.7)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A25 | Students' Reports on the Amount of Time Spent Watching Television Each Day

PERCENTAGE OF STUDENTS AND AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	One Hour or Less	Two Hours	Three Hours	Four to Five Hours	Six Hours or More
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL					
State	14 (0.7)	24 (1.1)	26 (1.1)	25 (1.0)	10 (0.8)
	276 (2.4)	272 (1.8)	269 (1.6)	262 (1.6)	244 (2.7)
Nation	12 (0.8)	21 (0.9)	22 (0.8)	28 (1.1)	16 (1.0)
	269 (2.2)	266 (1.8)	265 (1.7)	260 (1.7)	245 (1.7)
RACE/ETHNICITY					
White					
State	14 (0.7)	26 (1.1)	28 (1.2)	24 (1.2)	7 (0.8)
	279 (2.0)	277 (1.4)	273 (1.1)	267 (1.5)	255 (2.6)
Nation	13 (1.0)	23 (1.2)	24 (1.1)	27 (1.4)	12 (1.2)
	276 (2.5)	275 (2.2)	272 (1.9)	267 (1.7)	253 (2.6)
Black					
State	8 (1.5)	12 (2.4)	15 (1.4)	36 (2.8)	29 (2.4)
	*** (***)	*** (***)	*** (***)	244 (3.9)!	232 (4.4)
Nation	6 (0.8)	13 (1.7)	17 (2.1)	32 (1.8)	32 (2.2)
	*** (***)	239 (7.0)	239 (5.0)	239 (4.0)	233 (2.5)
Hispanic					
State	8 (2.9)	24 (4.5)	26 (4.8)	21 (4.2)	21 (5.9)
	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Nation	14 (2.4)	20 (2.5)	19 (2.1)	31 (3.1)	17 (1.7)
	*** (***)	245 (3.2)	242 (5.6)	247 (3.5)	236 (3.8)
TYPE OF COMMUNITY					
Advantaged urban					
State	20 (2.1)	28 (2.7)	27 (3.1)	20 (1.9)	5 (1.0)
	298 (2.2)!	291 (4.2)!	290 (4.1)!	276 (3.0)!	*** (***)
Nation	18 (1.4)	25 (4.3)	21 (1.8)	30 (4.3)	6 (2.0)
	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Disadvantaged urban					
State	10 (1.9)	16 (3.1)	23 (2.0)	31 (2.3)	20 (2.6)
	*** (***)	*** (***)	248 (6.3)!	248 (4.8)!	*** (***)
Nation	9 (1.2)	17 (3.1)	19 (2.1)	34 (2.4)	20 (3.2)
	*** (***)	250 (4.0)!	255 (5.0)!	251 (4.7)!	238 (4.5)!
Extreme rural					
State	17 (2.4)	26 (4.2)	30 (5.2)	21 (4.7)	7 (1.2)
	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Nation	14 (3.3)	19 (2.6)	23 (2.0)	26 (2.7)	19 (3.8)
	*** (***)	*** (***)	*** (***)	256 (3.6)!	*** (***)
Other					
State	13 (0.9)	25 (1.3)	27 (1.5)	25 (1.4)	9 (1.2)
	273 (2.7)	272 (1.8)	269 (1.5)	265 (2.0)	251 (3.2)
Nation	12 (1.0)	21 (1.0)	23 (1.2)	27 (1.2)	17 (1.4)
	268 (2.6)	269 (2.3)	265 (2.1)	259 (2.2)	246 (2.5)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A25
(continued)

Students' Reports on the Amount of Time Spent Watching Television Each Day

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	One Hour or Less	Two Hours	Three Hours	Four to Five Hours	Six Hours or More
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL					
State	14 (0.7) 276 (2.4)	24 (1.1) 272 (1.8)	26 (1.1) 269 (1.6)	25 (1.0) 262 (1.6)	10 (0.8) 244 (2.7)
Nation	12 (0.8) 269 (2.2)	21 (0.9) 268 (1.8)	22 (0.8) 265 (1.7)	28 (1.1) 260 (1.7)	16 (1.0) 245 (1.7)
PARENTS' EDUCATION					
HS non-graduate					
State	9 (2.5) *** (***)	19 (4.0) *** (***)	24 (4.4) *** (***)	38 (4.6) *** (***)	11 (2.8) *** (***)
Nation	12 (2.2) *** (***)	20 (3.1) *** (***)	21 (2.8) *** (***)	28 (2.9) 244 (3.2)	20 (2.4) *** (***)
HS graduate					
State	10 (1.2) 264 (3.4)	22 (1.7) 260 (3.0)	27 (1.6) 258 (1.8)	29 (1.5) 255 (2.0)	12 (1.4) 241 (3.1)
Nation	8 (1.0) 249 (4.7)	17 (1.4) 257 (2.8)	23 (2.0) 259 (3.2)	32 (2.3) 253 (2.5)	19 (1.6) 248 (3.0)
Some college					
State	12 (1.3) 281 (4.0)	27 (2.3) 277 (2.5)	30 (1.8) 272 (2.7)	21 (2.1) 265 (2.5)	11 (1.2) *** (***)
Nation	10 (1.4) *** (***)	25 (2.4) 275 (2.7)	23 (2.6) 269 (3.5)	28 (2.2) 267 (2.5)	14 (1.5) 242 (3.4)
College graduate					
State	19 (1.3) 287 (3.2)	27 (1.6) 285 (2.4)	27 (1.9) 283 (2.5)	21 (1.5) 275 (3.1)	7 (0.9) *** (***)
Nation	17 (1.3) 282 (2.6)	22 (1.6) 280 (2.5)	23 (1.1) 277 (2.2)	25 (1.5) 270 (2.4)	12 (1.1) 255 (3.2)
GENDER					
Male					
State	13 (1.1) 278 (2.9)	24 (1.3) 274 (2.8)	27 (1.4) 272 (2.1)	26 (1.5) 265 (2.1)	10 (0.9) 247 (3.2)
Nation	11 (0.9) 269 (3.3)	22 (1.2) 267 (2.6)	22 (1.0) 267 (2.2)	28 (1.3) 262 (2.1)	17 (1.5) 248 (2.5)
Female					
State	14 (1.0) 274 (3.4)	25 (1.3) 271 (1.8)	26 (1.3) 266 (2.2)	25 (1.6) 259 (2.1)	11 (1.1) 240 (3.2)
Nation	14 (1.1) 269 (2.8)	20 (1.3) 269 (2.2)	23 (1.4) 264 (1.8)	28 (1.6) 258 (1.9)	15 (1.2) 241 (2.2)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A26 | Students' Reports on the Number of Days of School Missed

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**None**	**One or Two Days**	**Three Days or More**
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	41 (1.1) 271 (1.5)	35 (1.1) 269 (1.8)	24 (1.0) 254 (2.1)
Nation	45 (1.1) 265 (1.8)	32 (0.9) 266 (1.5)	23 (1.1) 250 (1.9)
RACE/ETHNICITY			
White			
State	41 (1.1) 275 (1.3)	38 (1.1) 274 (1.2)	22 (1.0) 263 (1.6)
Nation	43 (1.2) 273 (1.8)	34 (1.2) 272 (1.7)	23 (1.2) 258 (2.1)
Black			
State	41 (4.8) 246 (5.0)!	27 (3.4) 238 (3.1)!	32 (3.4) 228 (3.6)!
Nation	56 (3.1) 240 (3.2)	21 (1.8) 240 (4.1)	23 (2.5) 224 (3.5)
Hispanic			
State	30 (5.1) *** (***)	26 (5.5) *** (***)	45 (5.3) *** (***)
Nation	41 (3.3) 245 (4.6)	32 (2.2) 250 (3.3)	27 (2.6) 235 (3.1)
TYPE OF COMMUNITY			
Advantaged urban			
State	40 (2.8) 293 (4.1)!	40 (3.9) 288 (3.0)!	20 (2.5) 280 (3.6)!
Nation	47 (2.3) 284 (4.4)!	38 (2.6) 279 (4.5)!	15 (3.7) *** (***)
Disadvantaged urban			
State	34 (4.0) 256 (6.9)!	32 (2.0) 245 (7.5)!	35 (3.0) 232 (4.3)!
Nation	42 (3.3) 254 (3.7)!	26 (1.8) 256 (4.2)!	32 (2.7) 238 (6.3)!
Extreme rural			
State	43 (3.7) 270 (3.4)!	30 (3.2) *** (***)	27 (2.8) *** (***)
Nation	43 (4.4) 257 (4.1)!	32 (4.2) 264 (5.8)!	25 (3.9) *** (***)
Other			
State	42 (1.3) 271 (1.5)	38 (1.3) 270 (1.6)	21 (1.3) 257 (2.2)
Nation	45 (1.3) 265 (2.2)	32 (1.1) 266 (1.9)	23 (1.1) 251 (2.4)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A26
(continued)

Students' Reports on the Number of Days of School Missed

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	None	One or Two Days	Three Days or More
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	41 (1.1) 271 (1.5)	35 (1.1) 269 (1.8)	24 (1.0) 254 (2.1)
Nation	45 (1.1) 265 (1.8)	32 (0.9) 266 (1.5)	23 (1.1) 250 (1.9)
PARENTS' EDUCATION			
HS non-graduate			
State	32 (4.3) *** (***)	34 (3.6) *** (***)	34 (3.9) *** (***)
Nation	36 (3.2) 245 (3.0)	26 (3.1) 249 (3.3)	38 (3.5) 237 (3.1)
HS graduate			
State	42 (1.9) 260 (1.6)	35 (1.7) 260 (2.0)	23 (1.8) 244 (2.7)
Nation	43 (2.1) 255 (2.0)	31 (1.9) 257 (2.6)	27 (1.9) 249 (2.4)
Some college			
State	40 (2.5) 276 (1.7)	37 (2.6) 272 (2.6)	24 (2.1) 260 (3.3)
Nation	40 (1.8) 270 (3.0)	37 (1.6) 271 (2.5)	23 (1.6) 253 (3.1)
College graduate			
State	43 (1.5) 284 (2.3)	36 (1.7) 283 (2.3)	22 (1.3) 270 (3.0)
Nation	51 (1.6) 275 (2.1)	33 (1.2) 277 (1.7)	16 (1.3) 265 (3.1)
GENDER			
Male			
State	43 (1.4) 273 (2.0)	34 (1.2) 272 (2.0)	23 (1.1) 258 (2.5)
Nation	47 (1.6) 266 (2.0)	31 (1.4) 267 (2.1)	22 (1.4) 250 (2.6)
Female			
State	39 (1.6) 270 (1.7)	37 (1.6) 267 (2.1)	25 (1.5) 250 (2.4)
Nation	43 (1.4) 264 (2.3)	32 (1.1) 266 (1.7)	25 (1.3) 250 (1.8)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A27 | Students' Perceptions of Mathematics

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	Strongly Agree	Agree	Undecided, Disagree, Strongly Disagree
	Percentage and Proficiency	Percentage and Proficiency	Percentage and Proficiency
TOTAL			
State	27 (1.0)	50 (0.9)	23 (1.0)
	275 (2.1)	267 (1.6)	255 (1.9)
Nation	27 (1.3)	49 (1.0)	24 (1.2)
	271 (1.9)	262 (1.7)	251 (1.8)
RACE/ETHNICITY			
White			
State	27 (1.0)	51 (1.0)	22 (1.0)
	280 (1.6)	273 (1.1)	262 (1.4)
Nation	26 (1.6)	48 (1.3)	26 (1.5)
	279 (2.0)	272 (1.8)	257 (2.0)
Black			
State	28 (2.8)	51 (2.8)	20 (3.5)
	247 (3.6)!	238 (4.4)!	*** (***)
Nation	32 (2.5)	52 (2.3)	16 (1.9)
	247 (4.1)	233 (3.3)	227 (4.2)
Hispanic			
State	28 (4.0)	41 (3.7)	31 (3.9)
	*** (***)	*** (***)	*** (***)
Nation	24 (2.5)	48 (2.6)	28 (2.1)
	257 (5.5)	244 (2.2)	236 (3.8)
TYPE OF COMMUNITY			
Advantaged urban			
State	28 (2.7)	51 (3.7)	21 (3.1)
	301 (4.2)!	288 (3.0)!	273 (2.8)!
Nation	17 (3.2)	55 (2.4)	28 (4.2)
	*** (***)	280 (4.1)!	*** (***)
Disadvantaged urban			
State	27 (3.0)	50 (2.6)	23 (2.8)
	257 (8.1)!	244 (5.6)!	231 (6.9)!
Nation	26 (2.9)	48 (2.9)	26 (3.2)
	260 (5.6)!	249 (4.6)!	240 (4.5)!
Extreme rural			
State	26 (4.0)	52 (3.0)	22 (4.3)
	*** (***)	270 (2.7)!	*** (***)
Nation	34 (2.8)	49 (2.2)	17 (1.4)
	270 (3.9)!	252 (4.1)!	*** (***)
Other			
State	26 (1.2)	50 (1.1)	24 (1.3)
	275 (1.9)	269 (1.6)	258 (2.0)
Nation	27 (1.4)	48 (1.2)	25 (1.4)
	271 (2.4)	263 (2.2)	250 (1.9)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. ! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

TABLE A27 (continued) | Students' Perceptions of Mathematics

PERCENTAGE OF STUDENTS AND
AVERAGE MATHEMATICS PROFICIENCY

1990 NAEP TRIAL STATE ASSESSMENT	**Strongly Agree**	**Agree**	**Undecided, Disagree, Strongly Disagree**
	Percentage and Proficiency	**Percentage and Proficiency**	**Percentage and Proficiency**
TOTAL			
State	27 (1.0)	50 (0.9)	23 (1.0)
	275 (2.1)	267 (1.6)	255 (1.9)
Nation	27 (1.3)	49 (1.0)	24 (1.2)
	271 (1.9)	262 (1.7)	251 (1.8)
PARENTS' EDUCATION			
HS non-graduate			
State	18 (2.6)	46 (4.5)	35 (5.2)
	*** (***)	250 (4.6)	*** (***)
Nation	20 (2.6)	50 (3.3)	30 (3.6)
	*** (***)	243 (2.6)	238 (4.3)
HS graduate			
State	25 (1.7)	49 (1.6)	26 (1.7)
	263 (2.0)	258 (1.6)	249 (2.8)
Nation	27 (2.1)	47 (2.3)	26 (2.0)
	262 (2.7)	255 (2.3)	245 (2.4)
Some college			
State	32 (2.1)	48 (2.3)	20 (1.8)
	273 (2.8)	273 (1.7)	260 (2.9)
Nation	28 (2.5)	47 (2.4)	25 (1.8)
	274 (3.1)	267 (1.9)	258 (3.2)
College graduate			
State	28 (1.4)	53 (1.8)	18 (1.4)
	291 (2.6)	279 (2.3)	271 (2.4)
Nation	30 (2.3)	51 (1.6)	19 (1.8)
	280 (2.4)	274 (2.2)	266 (2.5)
GENDER			
Male			
State	27 (1.3)	52 (1.4)	22 (1.5)
	278 (2.4)	270 (1.9)	258 (2.3)
Nation	28 (1.5)	48 (1.2)	24 (1.4)
	273 (2.3)	263 (2.0)	251 (2.4)
Female			
State	27 (1.2)	49 (1.2)	24 (1.2)
	272 (2.4)	264 (1.8)	253 (2.6)
Nation	26 (1.7)	50 (1.7)	25 (1.9)
	269 (2.1)	262 (1.8)	252 (1.9)

The standard errors of the estimated statistics appear in parentheses. It can be said with about 95 percent certainty that, for each population of interest, the value for the entire population is within ± 2 standard errors of the estimate for the sample. *** Sample size is insufficient to permit a reliable estimate (fewer than 62 students).

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The large number of states and territories participating in the first Trial State Assessment introduced many unique challenges, including the need to develop 40 different reports, customized for each jurisdiction based on its characteristics and the results of its assessed students. To meet this challenge, a computerized report generation system was built, combining the speed and accuracy of computer-generated data with high resolution text and graphics normally found only in typesetting environments. Jennifer Nelson created the system and led the computer-based development of the report. John Mazzeo oversaw the analyses for this report. John Ferris, David Freund, Bruce Kaplan, Edward Kulick, and Phillip Leung collaborated to generate the data and perform analyses. They were assisted by Drew Bowker, Laura McCamley, and Craig Pizzuti. Debra Kline coordinated the efforts of the data analysis staff. Stephen Koffler wrote the text for the report. Kent Ashworth was responsible for coordinating the cover design and final printing of this report.

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